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February 20, 2008

Mr. Michael Berkoff
Remedial Project Manager
U.S. Environmental Protection Agency-Region 5
77 W. Jackson Blvd. SR-6J
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Subject: 12th Street Landfill (Operable Unit #4 of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site), Otsego Township, Michigan
Draft Remedial Design Work Plan

Dear Michael:

In accordance with Section IX, Paragraph 28, of the Consent Decree for the Design and Implementation of Certain Response Actions at Operable Unit #4 and the Plainwell Inc., Mill Property of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Consent Decree) and Section III, Task 1, of the Statement of Work, Weyerhaeuser Company is submitting three copies of the draft Remedial Design Work Plan for the 12th Street Landfill (Operable Unit #4)[1]. This document contains the required components for the Remedial Design Work Plan, including a summary of the existing environmental information for the landfill, a description of the Emergency Action activities that were implemented at the 12th Street Landfill in 2007 that fulfilled certain components of the remedy, a Health and Safety Plan for the proposed pre-design field investigations, and revisions to the Multi-Area Quality Assurance Project Plan (QAPP) and the Multi-Area Field Sampling Plan (FSP) to support the pre-design field investigations.

To simplify your review of the Multi-Area QAPP, we have reproduced this document to focus your attention on sections of text and worksheets that were not part of previously approved versions. Revisions to the main text are highlighted in yellow, as are revisions to previous approved worksheets. For new worksheets, we simply highlighted the title. A summary of all the worksheets, including the date of the last revision, is provided in the table of contents (the new/revised worksheets with this submittal are highlighted in yellow). As an added visual aid, we copied the worksheet pages that have no changes on blue paper.

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(1) Pursuant to the project conference call on January 9, 2008, the U.S. EPA agreed that the timeline for developing the Remedial Design Workplan started on January 7, 2008, and that the Health and Safety Plan for the predesign field investigations could be submitted as part of the Remedial Design Workplan.

As we discussed with the U.S. EPA and the MDEQ during our meeting on December 7, 2007, Weyerhaeuser is proposing to expedite the schedule for the Remedial Design by streamlining the design submittals. This will allow the landfill cover and other remedial action activities to be constructed in 2009, which is a year sooner than would have been the case following the Remedial Design process outlined in Paragraph 28 of the Consent Decree. In addition to having submitted this document in less time than allowed under the Consent Decree (45 days instead of 60 days), Weyerhaeuser is proposing to submit a draft Design Report for review by the agencies that will include all the components of the pre-final Design Report, and to address the agencies' comments in the final Design Report (details are described in Section 6 of the Work Plan). To this end, we would appreciate receiving your comments on this draft Remedial Design Work Plan on or before March 24, 2008. Weyerhaeuser and RMT representatives would be amenable to meeting with you, at your convenience, to discuss your comments.

Please contact me, at (253) 924-3746, if you have any questions.

Sincerely,

Jennifer Hale

Jennifer Hale
Environmental Manager
Weyerhaeuser Company

cc: Eileen Furey – U.S. EPA, ORC (cover letter only)
Paul Bucholtz – MDEQ (2 copies)
Marty Lebo – Weyerhaeuser Company
John Gross – Weyerhaeuser Company
Joe Jackowski – Weyerhaeuser Company (cover letter only)
Mark Schneider – Perkins Coie (cover letter only)
Linda Hicken – RMT, Inc.
Kathy Huibregtse – RMT, Inc.

RMT

ENVIRONMENT • ENERGY • ENGINEERING

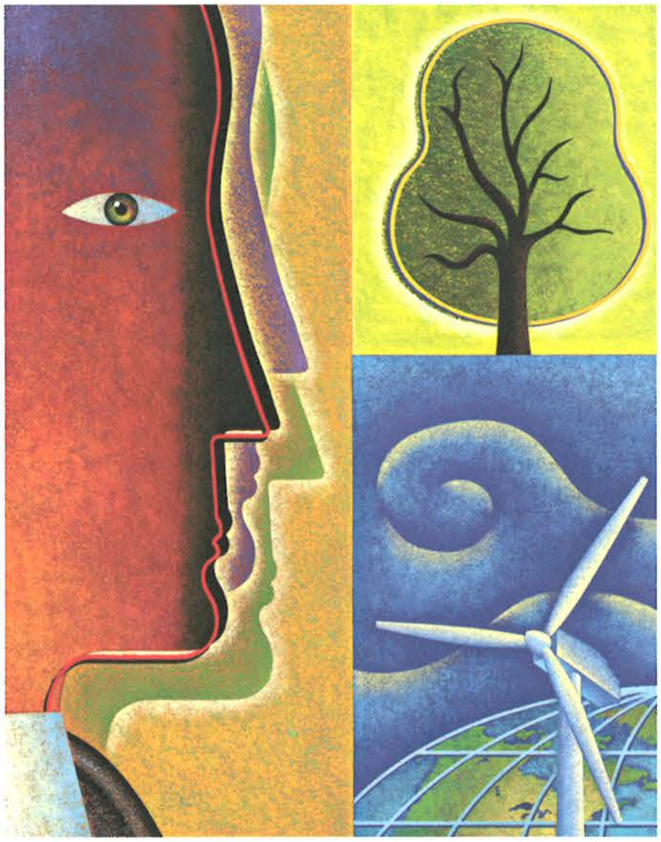
Draft Remedial Design Workplan

12th Street Landfill - Otsego Township, Michigan

Operable Unit No. 4 of the
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Prepared by RMT, Inc.
on behalf of Weyerhaeuser Company

February 2008



RMT

ENVIRONMENT • ENERGY • ENGINEERING

Draft Remedial Design Workplan

12th Street Landfill
Otsego Township, Michigan

Operable Unit No. 4 of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

February 2008

Prepared by RMT, Inc.
on behalf of Weyerhaeuser Company

RMT, Inc. | Weyerhaeuser Company
Final
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Section 1
Introduction

The 12th Street Landfill is Operable Unit #4 (OU-4) of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Kalamazoo River Superfund Site) and is located in Otsego Township, in Allegan County, Michigan (Figures 1 and 2). The landfill is located immediately downstream of the former Plainwell Impoundment. This impoundment is the focus of an on-going Time Critical Removal Action (TCRA) which includes excavation of bank soil and sediment affected by polychlorinated biphenyls (PCBs) and the removal of the Plainwell Dam that created the former powerhouse channel located along the eastern boundary of the landfill.

A remedial investigation and feasibility study (RI/FS) were completed for OU-4 by others under an Administrative Order on Consent (AOC) by the Michigan Department of Natural Resources (MDNR) that was issued in July 1993. A Remedial Investigation Report was issued on December 20, 1996 (G&M, 1996b), and was followed by a Focused Feasibility Study that was issued on July 11, 1997 (G&M, 1997). A Record of Decision (ROD) for OU-4 was issued on September 28, 2001. In January 2005, Weyerhaeuser Company (Weyerhaeuser) negotiated a Consent Decree (CD) with the U.S. EPA (Civil Action No. 1:05-CV0003) for the design and implementation of certain response actions at Operable Unit #4 and the Plainwell Inc. Mill. Specifically, the CD requires Remedial Design (RD) and Remedial Action (RA) activities for the 12th Street Landfill and RI/FS and an RD/RA activities for the former Plainwell Mill (Operable Unit #7).

Since the lodging of the CD for the 12th Street Landfill and the Plainwell Mill, the U.S. EPA authorized Weyerhaeuser to implement certain Emergency Actions at the 12th Street Landfill (U.S. EPA, 2007b). These Emergency Actions, which were completed in the summer and fall of 2007, were necessitated by the planned removal of the Plainwell Dam. The dam removal is a component of the TCRA being conducted in the former Plainwell Impoundment by the Kalamazoo River Study Group (KRSG) in 2007 and 2008 (U.S. EPA, 2007a). The Plainwell Dam is scheduled to be removed in 2008. A description of the Emergency Actions implemented at the 12th Street Landfill by Weyerhaeuser in 2007, and the effect on the schedule for the 12th Street Landfill Remedial Action and on the scope of this Remedial Design Workplan is provided in Subsection 3.3.

This RD Workplan has been prepared in fulfillment of the requirements for an RD Workplan for the 12th Street Landfill that are contained in the CD and the Statement of Work (SOW). The components of the RD Workplan that are specifically identified in the CD and/or the SOW are as follows:

- Documentation of the overall management strategy for performing the design, construction, operation, maintenance, and monitoring of the RA

- The responsibility and authority of all organizations and key personnel involved with implementation
- A description of the qualifications of key personnel directing the RD, including contractor personnel
- A schedule of remedial design activities, including each major activity and submission of deliverables (including the Preliminary Design, the Intermediate Design, the Prefinal/Final Design, the Construction Quality Assurance Plan, and the RA Workplan)
- A Quality Assurance Project Plan (QAPP), a Field Sampling Plan (FSP), and a Health and Safety Plan (HSP) to support the predesign field investigations

This document is organized into the following sections:

- Section 1: Introduction
- Section 2: Background
- Section 3: Summary of the Selected Remedy
- Section 4: Summary of Existing Information
- Section 5: Predesign Studies
- Section 6: Design Deliverables
- Section 7: Schedule
- Section 8: Project Management
- Section 9: References
- Appendices
    A. Multi-Area Quality Assurance Project Plan (QAPP) - Revision 2
    B. Multi-Area Field Sampling Plan (FSP) - Revision 2
    C. Health and Safety Plan for the Predesign Field Investigation

Given the number of actions and operable units along the Kalamazoo River, the U.S. EPA has determined that the use of multi-area support documents will provide more consistency and efficiency in review. Thus, the Emergency Actions undertaken by Weyerhaeuser in 2007 were conducted using a Multi-Area QAPP and a Multi-Area FSP which are updated as the workplans are developed for the different actions and operable units. At present, the approved Multi-Area QAPP and the Multi-Area FSP address the Emergency Actions conducted by Weyerhaeuser at the 12th Street Landfill and along the banks of the former Plainwell Mill property. Additional amendments to these documents to support the predesign studies for the 12th Street Landfill are described in Subsection 5.5 of this Workplan and are provided in Appendix A (Multi-Area QAPP) and Appendix B (Multi-Area FSP).

The Health and Safety Plan to support the predesign investigations at the 12th Street Landfill is provided in Appendix C.

Section 2
Background

2.1 Site Setting and Features

The 12th Street Landfill is located in Otsego Township (Section 24, Township 1N, Range 12W), approximately ½ mile northeast of the intersection of State Highway M-89 and 12th Street, and 1½ miles northwest of the city of Plainwell in Allegan County, Michigan (Figures 1 and 2). The U.S. EPA site identification number is MID0060077306.

The landfill is bordered to the east by the Kalamazoo River, to the south/southeast by woodlands that are owned by the State of Michigan (under the management of the Department of Natural Resources [MDNR]), to the southeast by the Plainwell Dam, to the southwest by a gravel mining operation, and to the north/northwest by wetlands (Figures 2, 3, and 4). The industrial property south of the landfill may be part of the gravel mining operations. The entrance to the property on 12th Street, which is gated and locked, is located near the southwestern corner of the landfill. Fencing runs along the street frontage near the property's southern border. Access is further limited by gates that restrict entry to the MDNR property and the area being addressed under the TCRA.

The Record of Decision (ROD) describes the PCB-contaminated areas that comprise OU-4 as follows:

- The 12th Street Landfill from which PCB contamination in surrounding areas migrated, including any groundwater and landfill leachate, if any.
- The woodland area located in the southeastern corner of OU-4.
- Wetlands, as identified by the National Wetland Inventory Map (Figure 5), adjacent to the landfill to the north and northwest
- A portion of the adjacent gravel operation property (adjacent property) that borders the landfill to the west
- A portion of the former powerhouse discharge channel of the Plainwell Dam on the Kalamazoo River, which contains residuals contiguous to the eastern side of the landfill

The landfill itself occupies an area of approximately 6½ acres. The landfill is situated on an approximately 24-acre property. Portions of OU-4, including the woodland area, the gravel operation adjacent to the landfill, and the former powerhouse discharge channel, are located outside the landfill property line (Figures 3 and 4). Contamination in the former powerhouse discharge channel was addressed as part of the Emergency Actions implemented in 2007 (refer to Subsection 3.3).

For purposes of this document, the term "site" refers to OU-4 as it is defined in the ROD.

2.2 Site History

The following histories of the landfill and the Plainwell Dam prior to approximately 2005 are based on information presented in documents prepared by/for others (B&B, 1992; G&M, 1994a; G&M, 1994b; G&M, 1996b; and Plainwell Paper, 1987).

2.2.1 12th Street Landfill

The 12th Street Landfill was in active operation from approximately 1955 to 1981. It was closed in 1984 by placing a soil cover over the fill and seeding the cover. Historical aerial photographs show that, prior to approximately 1955, the property on which the 12th Street Landfill is located was a wetland. During its operation, the landfill accepted paper residuals from the wastewater treatment plant at the former Plainwell Mill (mill) located in Plainwell, Michigan. The wastewater treatment plant initially consisted of a primary clarifier (built in 1954), which was later upgraded to include secondary treatment. Settled paper-making sludge (also referred to as residuals) from the clarifier was dewatered for several months in unlined lagoons at the mill, and was then hauled to, and disposed of, in the 12th Street Landfill. The landfill reportedly also accepted solid waste from the mill during part of its period of active operation. However, sanitary wastewater at the mill was discharged to the Plainwell publicly-owned treatment works (POTW).

In 1967, a full-scale secondary treatment system, consisting of an aerated lagoon and a clarifier, was built at the mill. Following construction of this treatment system, primary and secondary treatment system sludge, coal bottom ash, and coal fly ash were placed in the 12th Street Landfill until early 1981. In 1981, residuals remaining in some of the then-inactive lagoons at the mill were removed and placed in the landfill.

The paper residuals were disposed into a topographically low area of the 12th Street Landfill, which had received limited site preparation or engineering. The fill area was not lined and did not have a leachate collection system. Between 1955 and 1967, a retaining berm composed of sand, fly ash, and residuals was reportedly constructed around all but the southern side of the landfill. Subsequent field investigations showed that residuals are present outside the retaining berm in some areas. Historical aerial photographs show that disposal of paper residuals did not extend beyond 12th Street at the south end of the landfill property. The historical aerial photographs also show that 12th Street may have been "built up" relative to the adjacent land; potentially to access the Plainwell Dam during periods of high water. The thickness of residuals within the landfill varies, with an estimated maximum thickness of approximately 25 feet.

At present, the landfill rises up to approximately 30 to 35 feet above the surrounding areas to the west, north, and east. The sideslopes of the landfill are steep, with slopes up to approximately

2H:1V, except along the river, where the regrading activities that were conducted in 2007 as part of the U.S. EPA-authorized Emergency Action reduced the slope to 5H:1V.

2.2.2 Plainwell Dam

The Plainwell Dam (dam) in the Kalamazoo River is located adjacent to the woodland area to the southeast of the 12th Street Landfill (Figure 3). The dam was constructed in 1902 as part of a hydroelectric facility. Around 1965, the dam was decommissioned from power generation, and ownership of the dam was transferred from Consumers Power Company to the Michigan Department of Natural Resources (MDNR). The MDNR raised and jammed the spillway control gates in the open position in order to lower the water level in the upstream impoundment (located south of the dam). In 1986, the MDNR removed the powerhouse structure, which had previously been located near the western end of the dam, and performed other modifications to the dam embankments and structure.

In February 2007, the U.S. EPA authorized the Kalamazoo River Study Group (KRSG) to conduct a Time-Critical Removal Action (TCRA) in the former Plainwell Impoundment (U.S. EPA, 2007a). The TCRA was designed to be completed in two phases: Phase I was completed in 2007, and Phase II is scheduled to be completed in 2008. Phase II of the TCRA includes removal of the Plainwell Dam. When the dam is removed, the former powerhouse channel will become the new main channel of the Kalamazoo River. This will significantly increase the velocity of the river in the former powerhouse channel, which is currently a backwater, and along the 12th Street Landfill. In light of the anticipated effects that removal of the Plainwell Dam could have on sediment in the former powerhouse channel and on the landfill slope that abuts the river, the U.S. EPA authorized Weyerhaeuser to implement certain Emergency Actions at OU-4 in 2007 (U.S. EPA, 2007b) to mitigate a potential release of paper residuals/sediment containing polychlorinated biphenyls (PCBs) to the environment (the river). These Emergency Actions resulted in a modification of the remedial action sequencing as described in the ROD, including the expedited design and construction of several components of the remedy in the area adjacent to the former powerhouse channel. A description of these Emergency Actions and their effect on the remaining scope of the Remedial Action for OU-4 is provided in Subsection 3.3.

2.3 Ownership

The 12th Street Landfill property is currently owned by Plainwell, Inc., a bankrupt entity with no ongoing operations. Weyerhaeuser has entered into negotiations with Plainwell, Inc., to acquire ownership of the landfill property.

The landfill has been owned and operated by various entities, including Weyerhaeuser, which owned the landfill and the associated Plainwell Mill, between 1961 and 1970. The ownership history of the mill and the landfill is summarized in Table 2-1.

The woodland area to the south/southeast of the landfill is owned by the State of Michigan, under the management of the MDNR. The gravel mining operation southwest of the landfill is owned by Wyoming Asphalt and Paving Company, Inc.

2.4 Land Use

2.4.1 Current Land Use

Operable Unit #4 consists of the closed 12th Street Landfill and four areas outside the landfill where PCB-contaminated residual material has been observed. The entire landfill property includes the 6.5-acre closed landfill and the approximately 17 acres of wetland to the north/northwest of the landfill. There are no active operations or permanent buildings on the landfill property. After the eastern slope of the landfill (along the river) was regraded in 2007, temporary cover materials (6 inches of general fill, overlain by 6 inches of topsoil and a three-dimensional nylon turf reinforcement mat) were placed on this eastern slope to provide protection from erosion due to surface water runoff until the final cover is installed as part of the Remedial Action. The new temporary cover in this area may need to be reseeded in the spring of 2008. A more complete description of the Emergency Action conducted at OU-4 in 2007 is provided in Subsection 3.3.

The former powerhouse channel, which is located directly downstream of the dam, required excavation to remove visible paper residuals/sediment under the Emergency Action performed by Weyerhaeuser in 2007. In addition, permanent erosion protection (riprap) that was designed to withstand erosion forces from the re-routed river for a 500-year flood event, was installed along the landfill riverbank as part of the Emergency Action. A more complete description of the Emergency Action conducted at OU-4 in 2007 is provided in Subsection 3.3.

The woodland area to the south/southeast of the landfill was significantly altered in 2007 by activities conducted by the KRSG as part of the TCRA in the former Plainwell Impoundment. Restoration of the portion of the woodland area affected by the TCRA is expected be completed by the KRSG in 2008. The spatial extent of paper residuals beyond the 12th Street Landfill property line onto the woodland area is estimated to be less than approximately 50 feet, based on previous investigation. These residuals will be addressed during the design and construction of the final 12th Street Landfill remedy.

There is an active gravel mining operation on the property southwest of the 12th Street Landfill. The extent of paper residuals beyond the landfill property line onto the gravel mining property is estimated to be up to 100 feet, based on previous investigations.

2.4.2 Potential Future Land Use

At present, no decisions have been made regarding the future use of the 12th Street Landfill property following implementation of the Remedial Action. One option being considered is the development of an education-based natural park area that can showcase the history of the Kalamazoo River in that area and highlight the wetland habitat. In concept, this educational eco-park may include walkways on the landfill cover with signs at designated viewing areas that would describe the history and the ecology of the area. Another potential future land use option being considered is to provide access to the township to extend a riverwalk along the landfill property that would connect the existing riverwalks in the cities of Plainwell and Otsego. These potential future land use concepts will be further reviewed and developed during the remedial design process.

Section 3
Summary of the Selected Remedy

On the basis of the evaluations presented as part of the RI (G&M, 1996b) and the FS (G&M, 1997), the U.S. EPA selected the remedy for OU-4 as described in the Record of Decision (ROD), was issued on September 28, 2001. The remedy was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), as well as the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Part 300). It is consistent with the criteria contained in Section 121 of CERCLA, as summarized in Section I(J) (Statutory Determinations) of the ROD, including protection of human health and the environment, compliance with Applicable or Relevant and Appropriate Requirements (ARARs), and cost-effectiveness. The State of Michigan concurred with the selected remedy. The ROD was identified as applicable only to the 12th Street Landfill (OU-4).

3.1 Objectives of the Selected Remedy

The overall objectives of the selected remedy, as described in the ROD, are as follows:

- To eliminate the continued migration of PCBs from the 12th Street Landfill (OU-4) to the Kalamazoo River, as well as from the landfill to the woodland, wetland, adjacent property, and the former powerhouse discharge channel.
- To reduce the unacceptable risk associated with the landfill from exposure to PCBs, including:
  - Human health risks for persons who trespass or work on the 12th Street Landfill
  - Human health and ecological risks owing to past and continuing releases of PCBs to the woodland, wetlands, adjacent property, former powerhouse discharge channel, and the Kalamazoo River
  - Human health and ecological risks owing to the potential additional release of PCBs to the woodland, wetlands, adjacent property, former powerhouse discharge channel, and the Kalamazoo River caused by failure of the sides of the landfill

3.2 Components of the Selected Remedy

The specific components of the selected remedy, as described in the ROD and SOW, are outlined in the subsections that follow.

3.2.1 Excavation and Relocation of Residuals into the Landfill

Contaminated residuals in the woodland, wetlands, adjacent property, and the former powerhouse channel are to be excavated and relocated into the landfill. Excavation along the eastern side of the landfill (along the former powerhouse channel) is to be extensive enough to create a buffer zone to ensure that there is no direct contact between the to-be-constructed landfill containment system and the Kalamazoo River/former powerhouse channel. Upon completion, the excavated areas are to be restored.

3.2.2 Landfill Cover

An engineered cover is to be installed over the landfill in compliance with the State of Michigan Part 115, Solid Waste Management Act requirements. The landfill cover is to consist of the following components, from top to bottom:

- A vegetative (erosion) layer at least 6 inches thick, designed to promote vegetative growth, provide surface water runoff, and minimize erosion
- A general fill (protective) layer at least 24 inches thick, capable of sustaining the growth of nonwoody plants, and with adequate water-holding capacity
- A polyvinyl chloride (PVC) geomembrane at least 30 mils thick, or its equivalent
- A layer of select granular fill at least 6 inches thick, from an off-site source, having a minimum hydraulic conductivity of 1×10^{-3} cm/s
- The need for a gas venting system is to be evaluated during the predesign studies (see Subsection 5.2). If a gas venting system is required, the select granular fill layer is to be designed to act as a gas venting layer.

3.2.3 Erosion Protection and Sidewall Containment System

Erosion protection is to be installed on the sidewalls of the landfill, sufficient to provide protection from a 500-year flood event. The erosion protection is to extend to a minimum elevation of 2 feet above the 100-year flood elevation or to a minimum elevation of 707.0 feet above mean sea level (M.S.L.). A containment system is to be constructed around the outside of the landfill, to prevent release of PCB-contaminated soil, residuals, and leachate, and to provide slope stability, and flood and erosion protection.

3.2.4 Short-Term and Long-Term Monitoring Programs

Short-term Monitoring

Surface water monitoring is to be performed during all construction and excavation activities that may have an impact on surface water.

Air monitoring is to be performed as necessary to ensure that RA activities do not violate state air quality rules.

Long-term Monitoring

Long-term groundwater monitoring is to be performed following construction of the remedy. Groundwater monitoring is to be conducted in accordance with the State of Michigan Part 201 requirements. The number and location of groundwater monitoring wells is to be specified as part of the RD. Groundwater is to be sampled and analyzed as described below, unless modified in the approved Final O&M Plan:

- Semiannual monitoring: Laboratory analysis will include PCBs; dioxins; Target Analyte List (TAL) inorganics; Target Compound List (TCL) organics; measurement of groundwater and surface water levels; as well as the field parameters turbidity, temperature, pH, and conductivity.
- Quarterly monitoring: A smaller list of indicator parameters will be sampled on a quarterly basis. The list of indicator parameters will be specified in the RD, but will include, at a minimum, PCBs, measurement of groundwater and surface water levels, as well as the field parameters turbidity, temperature, pH, and conductivity.
- After a minimum of 2 years of sampling under the Semiannual and Quarterly Monitoring Programs, Weyerhaeuser may petition to discontinue quarterly monitoring, and sample on a semiannual basis. Weyerhaeuser may at that time also petition to limit the number of parameters included in the Semiannual Monitoring program.
- After a minimum of 2 years of sampling on only a semiannual basis, Weyerhaeuser may petition to sample only on an annual basis if sampling results or site conditions have not changed significantly between sampling events.
- After a minimum of 5 years of sampling on an annual basis, Weyerhaeuser may petition to sample every 5 years if sampling results have not changed significantly between sampling events. The samples collected on a 5-year basis will be analyzed for the parameters specified in the original Semiannual Monitoring Program.
- The continued need for groundwater monitoring will be evaluated at the first Five-Year Review, and at each review thereafter.

3.2.5 Leachate Collection

The need for either an interim or a long-term leachate collection system is to be evaluated during the preliminary design phase. The evaluation is to consider the water content of the waste, the presence and quantity of perched water within the landfill, the potential for and the effect of waste settlement, and the practicability of extracting water from the residuals matrix. If necessary, a temporary or long-term leachate collection system will be designed and constructed.

3.2.6 Fencing and Permanent Markers

A fence is to be constructed to enclose the landfill. Permanent markers are to be placed around the perimeter of the landfill describing the restricted area of OU-4, and the nature of any restrictions. Warning signs are to be posted on the fence every 200 feet, and on all entry gates.

3.2.7 Deed Restrictions

Weyerhaeuser is to rely upon the existing Restrictive Covenant (MDEQ Reference No. RC-RRD-03-052 on U.S. EPA Site No. 059B), permanently filed for the property on April 23, 2004, to regulate future use of the landfill. If any further deed restrictions are necessary on adjacent properties, Weyerhaeuser will attempt to obtain such deed restrictions in accordance with Section XI of the Consent Decree. (If Weyerhaeuser obtains ownership of the landfill property as planned, it will review, and possibly modify as may be needed, the existing deed restrictions. Any modifications will be consistent with the ROD and will be presented to the U.S. EPA for review prior to implementation.)

3.2.8 Long-Term Maintenance

Long-term maintenance and post-closure care are to be implemented in accordance with the approved Final Operation and Maintenance (O&M) Plan, which will be developed as part of the Final Design deliverable.

3.2.9 Other Provisions

Measures are to be taken during the construction activities to minimize the noise and dust impacts of construction upon the surrounding community. Fugitive dust emissions are to be monitored and controlled in a manner to ensure compliance with the standards contained in Part 55, Air Pollution Control, of the Natural Resources and Environmental Protection Act (NREPA).

A Five-Year Review is to be conducted by the U.S. EPA within 5 years after commencement of the RA, and every 5 years thereafter. These reviews are to evaluate whether the remedy continues to provide adequate protection of human health and the environment and to determine if any additional action is needed for the remedy to be protective.

3.3 Completed Emergency Actions

Since the lodging of the CD for the 12th Street Landfill and the Plainwell Mill, the U.S. EPA authorized Weyerhaeuser to implement certain Emergency Actions at the 12th Street Landfill to mitigate a potential release of paper residuals/sediment containing PCBs to the environment (the river) (U.S. EPA, 2007b). These Emergency Actions, which were completed in the summer and fall of 2007, were necessitated by the U.S. EPA's authorization in 2007 of a TCRA in the former Plainwell Impoundment to be implemented by the KRSG in 2007 and 2008 (U.S. EPA, 2007a). The TCRA included, among other activities, the removal of the Plainwell Dam, which is located immediately upstream of the 12th Street Landfill. When the dam is removed (scheduled in 2008), the former powerhouse channel will become the new main channel of the Kalamazoo River. This will significantly increase the velocity of the river in the former powerhouse channel, which is currently a backwater, and along the 12th Street Landfill.

The objectives of the Emergency Action in the former powerhouse channel were as follows:

- To remove visible paper residuals from the channel before the main flow of the Kalamazoo River is rerouted through the channel
- To install a final erosion protection system along the west bank of the former powerhouse channel in conformance with the requirements of the ROD.
- To conduct the Emergency Action in a manner that will be compatible with the other requirements specified in the ROD.

The Emergency Action was conducted pursuant to the Emergency Response Plan Design Report (RMT, 2007c), the Multi-Area QAPP, and the Multi-Area FSP (RMT, 2007a, and 2007b, respectively).

The Emergency Action included the following activities:

- **Site preparation** - Site preparation involved clearing and grubbing along the riverbank and in limited areas of the landfill as required to allow construction of the access road, a working area along the former powerhouse channel, and a containment area for placement of the excavated residuals and soil.
- **Grading of the eastern slope of landfill** - The eastern slope of the landfill was cut back to an approximately 5H:1V slope. All of the material removed from the eastern slope was moved onto the top of the landfill. Any material with visible residual material was placed within the mixed fill/paper residual placement area on the top of the landfill (Figure 4). This area was a depression created by removing a portion of the existing cover soil and using the cover material to construct a berm to contain water and mixed fill/paper residuals.
- **Channel dewatering and residuals removal** -A Portadam™ system was installed in the former powerhouse channel to allow dewatering of the channel and facilitate removal of the residuals. The water in the Portadam™ enclosure was removed to within 1.5 feet of the sediment surface and pumped through a basin and retention area prior to discharge to the Kalamazoo River. While the water levels were depressed, paper residuals were removed using a long-reach excavator in the former powerhouse channel. Any area with visible residual material was excavated, and the material was transported to the mixed fill/paper residual placement area on the top of the landfill. Sediment samples were collected to document the removal. Residual surface sediment concentrations were less than 1 mg/kg total PCBs. Approximately 600 cubic yards of material were removed from the channel and placed on the top of the landfill. In addition, the sediment/soil adjacent to the river was excavated to allow for the placement of the erosion protection system on the landfill and to limit the potential for the river to come in contact with paper residuals in the landfill. Soil excavated from the bank that contained visible residuals was also moved to the mixed fill/paper residual placement area.
- **Residuals dewatering and disposal** - Excavated materials on the mixed fill/paper residual placement area on top of the landfill were gravity-drained.

- **Landfill slope protection** - A buffer zone was created along the former powerhouse channel by cutting back approximately 25 feet of the eastern slope of the landfill adjacent to the river (Figure 6). This distance will provide space for the future construction of the landfill final cover and an approximately 10-foot–wide road for the future installation of, and access to, groundwater monitoring wells. As part of the Emergency Action, a clay wedge was constructed along the base of the regraded eastern slope. This material will provide the required hydraulic separation between the paper residuals and the river along the eastern slope. The remainder of the landfill final cover will be constructed as part of the remedial action.
- **Erosion protection along the riverbank** – Following the removal of the visible residuals/sediment in the channel, the riverbank was regraded to a 3:1 slope. An 8-ounce nonwoven geotextile fabric was placed over the bank materials. This was overlain by riprap (D_{50} of 9 inches). A trench was keyed into the toe of the riverbank to prevent undercutting of the bank. A temporary silt fence was installed along the upslope edge of the riprap to contain potential sediment runoff from the face of the landfill.

  Upslope of the riprap, 6 inches of general fill material were placed on the eastern slope. This was overlain by 6 inches of topsoil. The topsoil was then covered by erosion control matting (Enkamat®, which is a three-dimensional nylon turf reinforcement mat made of nylon filaments joined at the intersections). The Enkamat® was hydroseeded to promote faster vegetative growth on the matting (Figure 6).
- **Vegetation** - The earthwork activities along the eastern slope of the landfill and the riverbank were completed in early October 2007, near the end of the growing season. The area above the hydroseeded Enkamat® will likely need to be reseeded in the spring of 2008.

Details of the activities completed as part of the Emergency Action will be provided in a construction documentation report that will be submitted to the U.S. EPA in early 2008.

As a result of the Emergency Action completed in 2007, the following components of the selected remedy for OU-4, described in Subsection 3.2, have either been fully or partially completed:

- **Excavation and relocation of residuals into the landfill -** Visual residuals in the former powerhouse channel were delineated, excavated, and relocated into the landfill. Excavation along the eastern side of the landfill (along the former powerhouse channel) was extensive enough to create an adequate buffer zone to ensure that there will be no direct contact between the landfill containment system and the Kalamazoo River/former powerhouse channel.

  No further action is needed in the former powerhouse channel.

  Excavation and relocation of residuals in woodland, wetlands, and the adjacent gravel mining property will be completed as part of the Remedial Action.
- **Erosion protection and sidewall containment system on the eastern slope of the landfill –** Erosion protection and sidewall containment were installed on the eastern slope of the landfill (adjacent to the river) that are sufficient to provide protection from a 500-year flood event. The erosion protection extended to a minimum elevation of 707.0 feet M.S.L. Calculations showed that the Kalamazoo River would rise to approximately elevation 705.5 feet M.S.L. during a 500-year flood event (RMT, 2007c). No further action is needed to provide erosion protection and sidewall containment on the eastern slope of the landfill.

  Erosion protection and sidewall containment will be constructed around the remainder of the landfill as part of the Remedial Action.

Section 4
Summary of Existing Information

A number of investigations have been performed at the site by various parties, including the KRSG, the U.S. EPA, the MDEQ, and Weyerhaeuser. These investigations are summarized in a chronological manner in the table included in Appendix D. The most comprehensive investigations were the RI activities associated with the landfill, the surrounding areas, and groundwater, that were performed on behalf of the KRSG by Geraghty & Miller, Inc. (G&M), throughout the early to mid-1990s; a predesign geotechnical investigation of the landfill area that was performed on behalf of the KRSG by Blasland, Bouck & Lee, Inc., in 2001; and a predesign soil, residual, and sediment sampling study performed on behalf of the U.S. EPA by Environmental Design International, Inc. (EDI), in September 2003 (U.S. EPA, 2004). The locations of the samples that were collected as part of these previous investigations are shown on Figures 7 and 8.

Table 4-1 summarizes the available data for the area within the existing footprint of the landfill, the surrounding areas, the sediment in the former powerhouse discharge channel (pre-2007 Emergency Action), as well as groundwater and surface water. This table synthesizes the data from previous investigations (as summarized in Appendix D), presenting the data grouped by area of the site. Some of the data collected as part of previous investigations, while valuable in meeting the objectives of a particular investigation, are not directly useful for Remedial Design (RD) purposes. Results and conclusions from the data that are relevant to the RD process, and limitations pertaining to use of the data for design purposes, are summarized in Table 4-1, and are discussed in the subsections that follow.

The objectives and scope of the planned predesign studies that are needed to resolve the few remaining uncertainties are presented in Section 5.

4.1 Geology and Hydrogeology

The geology and hydrogeology of the region and the site have been investigated as part of the RI/FS activities of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site and as part of the RI activities for the 12th Street Landfill. Details are provided in the Description of the Current Situation for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (B&B, 1992), the RI/FS Technical Memorandum 8 for the 12th Street Landfill (G&M, 1994b), and the RI report for the 12th Street Landfill (G&M, 1996b). The following is a synopsis of this information as it may be pertinent to the development of the predesign studies.

4.1.1 Regional Geology

The uppermost natural geologic unit in the local area consists of unconsolidated silt, sand, and gravel comprising recent floodplain deposits of the Holocene Epoch. The Wisconsinan Stage surficial glacial deposits are estimated to be as thick as 200 feet in the vicinity of the landfill. Underlying the glacial deposits is the Coldwater Shale Formation, which consists of a gray shale interbedded with dolomite (B&B, 1992; G&M, 1996b).

4.1.2 Site Geology

The wetland to the north of the landfill is comprised of aquent and histosol soil (G&M, 1994b). Loamy sands are present along the Kalamazoo River channel (G&M, 1994b; National Resources Conservation Service, 2007).

Geologic information for the soils underlying the landfill was obtained from soil borings that were completed within the landfill footprint. The shallow, unconsolidated deposits underlying the landfill (shown on Figures 3-2 and 3-3 in Appendix E of this RD Workplan) consist of the following:

- Topsoil that is generally silty to sandy with moderate to high organic content ranging in thickness from approximately 0.5 to 3.5 feet
- Discontinuous deposits of peat, ranging in thickness from approximately 2 to 3 feet
- Interbedded fine to coarse sand, and medium to coarse sand, with gravel that extends to at least the depths of the deepest borings completed within the footprint of the landfill, and that has a minimum thickness ranging from 20 to 50 feet
- Occasional thin (0.5 foot) brown clay lenses within the sand/sand and gravel unit

4.1.3 Topography

At present, the landfill rises up to approximately 30 to 35 feet above the surrounding areas to the west, north, and east. The landfill ranges in elevation from approximately 702 feet M.S.L. near the toe of the northern landfill slope and along the river, to approximately 734 feet M.S.L. near 12th Street. The sideslopes of the landfill are steep up to approximately 2H:1V, except along the river, where the regrading activities that were conducted in 2007 as part of the U.S. EPA-authorized Emergency Action reduced the slope to approximately 5H:1V.

A topographic survey performed in March 2005 showed that ground surface elevations in the wetlands north of the landfill range from approximately 702 feet M.S.L. near the toe of the landfill slope, to approximately 698 to 700 feet M.S.L. at the Kalamazoo River's edge.

The landfill is approximately 10 to 12 feet higher than the woodland area to the south/southeast of the landfill, except along the river, where the regrading activities that were conducted in 2007 as part of the U.S. EPA-authorized Emergency Action removed paper residuals and other fill material. The regrading activities were performed to provide space for the future construction of the landfill final cover and an approximate 10-foot–wide road for the future installation of, and access to, groundwater monitoring wells. The regraded area along the river is currently slightly lower in elevation than the woodland area.

The northern portion of the woodland area is relatively flat and ranges in elevation from approximately 708 to 710 feet M.S.L. The woodland area then slopes up toward 12th Street to an approximate elevation of 730 feet M.S.L.

The woodland area was significantly altered in 2007 by activities conducted by the KRSG as part of the TCRA in the former Plainwell Impoundment. It is anticipated that the KRSG will restore the portion of the woodland area affected by the TCRA in 2008.

The slope along the southwest side of the 12th Street Landfill drops steeply onto the active gravel quarry, which is approximately 25 feet lower than the landfill.

4.1.4 Hydrogeology and Groundwater Quality

On-Site Groundwater Occurrence and Flow

There are 15 existing groundwater monitoring wells on-site (Figure 4), although the current condition of these wells is unknown. Nine of the 15 monitoring wells were installed within the footprint of the landfill (G&M, 1994b) to depths ranging from 10 to 26 feet below ground surface. Selected information from the well construction diagrams is summarized in Table 4-2.

Shallow groundwater occurs in the interbedded fine sand to coarse gravel unit and is hydraulically connected to the Kalamazoo River. The water table is present near the ground surface in the wetland and at the bank of the river. Regionally, the Kalamazoo river is a point of net groundwater discharge, however, locally, the Plainwell Dam has a major influence on groundwater flow. Upstream of the dam, where surface water is impounded, surface water flows into the groundwater system, flows around either side and beneath the dam, and discharges to the river on the downstream side of the dam. The landfill materials locally confine the shallow sand and gravel alluvium, but areas outside the landfill are unconfined. Hydraulic conductivities calculated from slug tests ranged from 1.2×10^{-1} cm/s to 5.3×10^{-3} cm/s, with a geometric mean of 1.6×10^{-2} cm/s (G&M, 1994b).

Once the Plainwell Dam is removed as part of the second phase of the TCRA (scheduled in 2008), the former powerhouse channel will become part of the main channel of the Kalamazoo River. Groundwater in the shallow sand and gravel alluvium will locally respond to the dam removal. As the water levels in the impoundment return to the historic riverbank elevations, groundwater upstream of the former dam should reverse and begin to discharge to the river, as it would have under natural conditions. Groundwater downstream of the former dam will continue to discharge to the river, however, without the local downstream component of flow that had been induced by flow around the dam.

Groundwater occurrence, flow direction, and gradients have been adequately established for purposes of conducting the Remedial Design. No additional investigation of groundwater occurrence and flow is planned.

Groundwater Quality

The existing information indicates that groundwater quality has not been adversely affected by the landfill. PCBs have never been detected in site groundwater and, with the exception of one leachate sample collected at LH-1 (where Aroclor-1242 was reported at 1.4 μg/L), PCBs were not detected in leachate during the RI (G&M, 1996a).

The compound bis(2-ethylhexyl)phthalate was detected in one groundwater sample. (MW-3A Dup) at a concentration (290 μg/L), which exceeded the Michigan Part 201 groundwater/surface water interface (GSI) criterion of 59μg/L (G&M, 1994b; G&M, 1996b). However, bis(2-ethylhexyl)phthalate was not detected in any leachate, soil, sediment, or residual samples. In light of having only being detected in site media in one groundwater sample, which was not confirmed by its replicate sample or in subsequent sampling, and because bis(2-ethylhexyl)phthalate is a common laboratory contaminant, the environmental significance of the reported detection of bis(2-ethylhexyl)phthalate in groundwater is minimal. No other organic or inorganic chemicals exceeded water quality standards.

The existing water quality information is adequate to design the long-term groundwater monitoring program required in the ROD. No additional investigation is proposed as part of the Remedial Design.

4.2 Wetlands

Independent wetland evaluations have been conducted along the Kalamazoo River area as part of the ongoing CERCLA activities. Wetland delineations were conducted for the MDEQ in 1994 (G&M, 1994b) and in 2002 (CDM, 2002). The wetland delineation conducted in 2002 included the wetland north of the 12th Street Landfill. The report indicates that field conditions were consistent with those noted on the National Wetland Inventory (NWI) map (Figure 5), and that the vegetation, hydrology, and soils provide positive indicators of the presence of wetlands.

The 2002 delineation confirmed the wetland boundaries were consistent with the NWI map. The NWI map shows two types of wetlands adjacent to the landfill. The wetland area to the north/northwest of the landfill is a type PEMFh (palustrine emergent marsh semi-permanently flooded/impounded) wetland. The wetland area to the north/northeast of the landfill is a type PFO1Ch (broad-leafed deciduous forest subject to seasonal flooding [the "h" in "PFO1Ch" denotes "impounded"]) wetland.

The 2002 wetland delineation notes that "freestanding water" is present "up to the base of the landfill," and that the ground is saturated to the ground surface. However, the report did not identify the source of the water or the depth of the standing water above the ground surface. Moreover, the field notes indicate that it was raining during the field reconnaissance. The information is consistent with RMT's site visits conducted during a 13-month period in 2005 and 2006, which indicate that up to an inch of water may be ponded in some sections of the wetland at times, particularly following rainfall events. Frequent or sustained periods of inundation, such as would occur from overbank flooding, were not noted or observed in the wetland area immediately adjacent to the 12th Street Landfill.

4.3 Landfill

A total of 26 soil borings and 16 test pits have been installed inside the landfill. Data collected during these investigations is of use in determining the geometry of the existing fill, the thickness of residuals present, as well as the types and physical characteristics of the residuals/fill and berm materials present within the landfill. This information will be used in engineering tasks such as grading design, generation of engineering cross sections for slope stability settlement analysis, estimation of potential leachate generation, and other analyses. The locations of test pits and soil borings installed inside the landfill during previous investigations are shown on Figures 4 and 7.

4.3.1 Geotechnical Characteristics

The northern portion of the landfill consists primarily of paper residuals with localized deposits of construction debris in the northeastern area (refer to Figures 3-2 and 3-3 in Appendix E of this RD Workplan). The paper residuals within the landfill are generally described as light gray to dark gray, range in texture from clayey to fibrous, and contain trace amounts of rounded gravel (G&M, 1994a). The paper residuals were found to be approximately 25 feet thick at the thickest location (in the central portion of the landfill near GMSB-4) (G&M, 1994b). In addition, grain-size analysis, moisture content, and consolidation testing of the residuals was performed as part the geotechnical investigation conducted in 2001 (BBL, 2001). These results will be used estimate the settlement of the landfill under final closure conditions, and to evaluate the potential for the generation of leachate during the consolidation process. A zone of construction debris was identified in the southern portion of the landfill. Voids, potentially containing liquid, may be present within the construction debris. Specifically, Test Pit TP-9, which contained construction debris, yielded liquid when excavated (G&M, 1994a).

A containment berm that encircles the landfill on the north, west, and east was identified during the Test Pit Investigation (G&M, 1994a); however, the presence of the berm was not confirmed during a Geoprobe® investigation conducted on the eastern landfill sideslope along the Kalamazoo River as part of the Emergency Action performed by Weyerhaeuser in 2007 (RMT, 2007c).

The existing cover soil over the landfill consists of soil/sand/fly ash, and is reported to be approximately 1 to 7 feet thick (G&M, 1996b).

4.3.2 Leachate

The existing data are sufficient to evaluate the potential need for a leachate collection system as part of the Remedial Design process.

The information obtained from soil borings and test pits in the fill area indicates that zones of perched leachate are present in limited areas within the residuals. In the southern portion of the landfill, a 5- to 7-foot thick layer of construction debris was found below the cover and above the underlying residuals (refer to Figures 3-2 and 3-3 in Appendix E of this RD Workplan). Voids, potentially containing liquid, may be present within the construction debris. Specifically, Test Pit TP-9, which contained construction debris, yielded liquid when excavated (G&M, 1994a). Overall, the residuals within the landfill have a relatively high moisture content (BBL, 2001). However, experience at landfills containing similar materials suggests that the residuals may not yield a large volume of liquid owing to their high clay content.

During the RI activities, the leachate head wells were sampled on two occasions. During the first sampling event, the samples were analyzed for TCL/TAL parameters, PCBs, chemical oxygen demand, nitrate/nitrite, chloride, alkalinity, sulfate, total suspended solids, and total organic carbon. The second set of samples collected from the leachate head wells was analyzed for PCBs. With the exception of one leachate sample collected at LH-1 during the second sampling event (Aroclor-1242 was reported at 1.4 μg/L), PCBs were not detected in the leachate during the RI (G&M, 1996a).

4.3.3 Landfill Gas

No data from previous investigations are available concerning the potential presence of landfill gas at concentrations of concern. Landfill gas does not appear to be a significant issue under current site conditions based on the healthy cover vegetation and the absence of odors.

4.4 Extent of Paper Residuals Outside of the Landfill

A total of 69 borings have been drilled outside the landfill footprint (*i.e.*, beyond the toe of the slope) in the wetland and woodland areas, and on the adjacent gravel mining property. The locations of these borings are shown on Figure 8.

During the RI, the "delineation" borings (DB-1 through DB-14) were installed in the wetland to the north/northwest of the landfill and on the adjacent gravel mining property (G&M, 1994b). Although the materials encountered in these borings were not visually logged (*i.e.*, no boring logs were prepared or could be located by Weyerhaeuser), it has been inferred from the objective of these borings and the findings that were presented in the RI Report, that visible residuals were encountered in the inner ring of "delineation" borings and not in the outer ring of "delineation" borings, thereby establishing the horizontal extent of visible residuals in these areas. However, because the base of the residuals encountered in these borings was not reported, the vertical extent/thickness of residuals is uncertain at some of these locations.

In 2003, the U.S. EPA conducted a predesign investigation in the wetland and woodland areas (as well as in the former powerhouse channel, which was remediated as part of the Emergency Action in 2007) (U.S. EPA, 2004). The soil borings that were advanced as part of this investigation extended to a depth of approximately 2 feet below ground surface. Soil samples were sub-sampled by depth intervals of 0 to 6 inches, 6 to 12 inches, and 12 to 24 inches and analyzed for PCBs. These borings generally confirmed the delineation of the paper residuals in the wetland area that was established in the RI, and the presence of residuals in the woodland area that was suggested by the information obtained at monitoring well nests MW-6 and MW-7 in the woodland area. Figure 8 illustrates the approximate areal extent of visible paper residuals outside of the landfill based on data collected during the RI and the U.S. EPA's predesign investigation. This predesign investigation also provided information on the concentrations of PCBs in 159 samples of near surface soil and residuals (*i.e.*, from 0 to 24 inches).

The approximate thickness of paper residuals in the wetland can be estimated based on other available information, including the boring logs for the monitoring wells that were installed during the RI, and topography. The remaining uncertainty regarding the precise thickness of residuals in the wetland will not significantly affect either the remedial design or the remedial action. Consequently, no additional information is needed to delineate the areal extent of paper residuals outside the footprint of the landfill in the wetland. However, since Weyerhaeuser did not conduct any of the previous site investigations, information regarding the constructability issues associated with a high water table in the wetland and the degree of difficulty in distinguishing the visible paper residuals from the native soil will be useful for Weyerhaeuser during the remedial design activities.

In contrast, the uncertainty regarding the thickness of residuals in the woodland area and on the gravel mining property is more significant, considering the large amounts of material that are likely to need to be cut in these areas to achieve final grades, and to facilitate discussions with the owners of these properties.

4.5 100-Year Flood Elevation of the River

Previous documentation provides somewhat inconsistent information regarding the 100-year flood elevation in the vicinity of the landfill. The ROD states that the 100-year flood elevation at the site is 705 feet above M.S.L. However, Figure 2.3 in the Feasibility Study (G&M, 1997) for the site indicates that the 100-year flood elevation is 702.55 feet above M.S.L., which is consistent with a memorandum prepared by BBL that indicated that the 100-year flood elevation at the site is 702.5 feet above M.S.L. (BBL, 1998). Weyerhaeuser requested information about the flood elevation at the site from the Federal Emergency Management Agency (FEMA), the United States Geological Survey (USGS), the United States Army Corps of Engineers (USACE), and the National Weather Service, but no data were available from these agencies.

A 100-year flood elevation of 705.0 feet above M.S.L. was approved by the U.S. EPA as the design basis for the erosion control measures that were implemented as part of the Emergency Action in 2007 (U.S. EPA, 2007c). Use of the 705.0 foot elevation for the 100-year flood event was a conservative approach based on the existing information. Weyerhaeuser plans to use this elevation as the design basis for the remaining erosion control measures to be implemented as part of the Remedial Action, unless new information is obtained. While this elevation may be appropriate for the design of erosion protection features, it is not appropriate for habitat characterization.

Section 5
Predesign Studies

Predesign studies are proposed to assist in the development of the remedial design for OU-4. The proposed predesign studies, along with the objectives and scope of the studies, are summarized in the subsections that follow. Additional details regarding the methods, procedures, equipment, and materials are contained in the Multi-Area Quality Assurance Project Plan (QAPP) (Appendix A) and the Multi-Area Field Sampling Plan (FSP) (Appendix B).

Decontamination of equipment utilized during the predesign studies will be performed at a designated location on the top of the landfill. Decontamination water will be discharged to the landfill surface at a rate that allows infiltration into the landfill without running off the landfill.

5.1 Data for Grading Design

Additional data are needed to better estimate the thickness of paper residuals along the property boundaries with 12th Street, the quarry to the southwest, and with the State property to the southeast, in order to reduce uncertainties in designing the final cover grades and to support discussions with the owners of these adjacent properties concerning access for purposes of implementing the remedial action. The scope of the investigative work necessary to obtain these data is as follows:

- Advance approximately 9 Geoprobe® borings into the 12th Street Landfill at select locations where fill material is believed to extend beyond the property landfill boundary to the southwest and to the southeast (Geoprobe® borings RDB-01 through RDB-09 on Figure 9). The borings will be advanced approximately 5 feet into the native soil underlying the fill, or to refusal.
- Advance a minimum of two soil borings (RDB-10 and RDB-11) near the southern end of the landfill, as shown on Figure 9, to confirm the thickness of the fill in this area. Advance the borings approximately 5 feet into the native soil underlying the fill or to refusal. The locations of these borings may be adjusted in the field as necessary to avoid underground or aboveground utility lines. Additional borings may be installed to the north of the initial borings as may be deemed useful by Weyerhaeuser, in consultation with oversight agencies as needed, for purposes of designing the landfill cover (*e.g.,* if fill material is not encountered at a location where existing data indicates fill is present).
- Prepare a Soil Boring Log (refer to the FSP in Appendix B for a sample log) for each borehole based on visible observation. Classify the materials encountered based on the procedures outlined in ASTM D-2488. The logs will document the borehole identification number, the drilling dates and times, the names of field personnel, soil descriptions, sample depths, and recovery. Retain a representative sample of each type of material encountered (no laboratory analyses are planned). As may be appropriate, photographs of the materials encountered or other pertinent observations will be documented. Photographs will be labeled to indicate the subject, location, date, name of photographer, and project identification number.

- The on-site geologist/engineer will prepare the Soil Boring Logs in the field. The logs will be reviewed by the senior engineer in the office. A field notebook will also be maintained by the on-site scientist to document other pertinent field information. The senior engineer will review the field notebook for clarity and completeness in meeting the investigation objectives.
- Abandon the boreholes by filling them with bentonite grout following completion of the borehole logs.
- Decontaminate the drilling equipment following completion of the work. Decontamination of equipment between borings is not necessary. Decontamination will be performed at a designated location on the top of the landfill.
- Dispose Geoprobe® samples on-site. Decontamination water will be discharged to the landfill surface at a rate that allows infiltration into the landfill without running off the landfill.
- Survey the locations and ground surface elevations of the boreholes following completion. The accuracy of the survey will be ± 0.01 foot for the horizontal coordinates and ± 0.1 foot for the vertical elevations. The survey locations will be added to the boring logs.

5.2 Landfill Gas Evaluation

Based on experience with other landfills containing similar materials, a passive gas venting system is likely to be necessary to prevent potential off-site gas migration from the landfill and to protect the integrity of the landfill cover. The detailed design of the passive gas venting system will be prepared during the design phase for the 12th Street Landfill and may include features that support the potential future development of an "eco-park." The passive gas venting system will also be designed such that it could be retrofitted to an active gas system if deemed necessary during the operations, monitoring, and maintenance (OM&M) period for the landfill.

To assist in the design for the passive gas venting system, the following scope of work will be performed:

- Review information that may be provided by the MDEQ in connection with the management of subsurface landfill gas at the King Highway Landfill (Operable Unit #3) for potential applicability to the 12th Street Landfill.
- Measure the concentrations of methane, carbon dioxide, and oxygen in the existing groundwater monitoring wells at the 12th Street Landfill that are screened in the vadose zone (MW-6A, MW-7A, and MW-8A), and in the Geoprobe® boreholes used to estimate the depth of the paper residuals along the property boundaries (refer to Figure 9). Pressures that may have developed within the groundwater monitoring wells caused by excess landfill gas (if present) will also be measured.

A passive gas venting can be designed without the above information. If these data cannot be readily obtained, additional efforts will not be employed to collect the information.

5.3 Extent and Depth of Residuals Outside the Landfill Footprint

Wetland area to the north of the landfill - The approximate areal extent of visible paper residuals beyond the toe of the landfill within the wetland has been defined through previous investigations

(G&M, 1994b and U.S. EPA, 2004). This delineation needs to be confirmed at limited locations as part of the predesign studies. In addition, constructibility issues associated with a high water table in the wetland and the degree of difficulty in distinguishing the visible paper residuals from the native soil also need to be evaluated. The scope of the investigative work recommended to provide this information is as follows:

- Approximately three test pits (RDTP-01 through RDTP-03) will be excavated at the approximate locations in the wetland as shown on Figure 10. The test pits are anticipated to be approximately 10 to 15 feet long (perpendicular to the edge of the landfill) and approximately 2 to 4 feet wide. The test pits will be excavated to a maximum depth of 3 feet if no paper residuals are apparent, or to the bottom of visually-identifiable residuals. The depth and lateral extent of residuals in each test pit will be documented in the field by preparing a Test Pit Log (refer to the FSP for a sample log).
- If necessary, additional test pits may be excavated either closer to, or farther from, the toe of the landfill in order to adequately meet the investigative objectives.
- Equipment used to excavate the test pits will be decontaminated following completion of the work. Decontamination of equipment between test pits is not necessary. Decontamination will be performed at a designated location on the top of the landfill.
- Decontamination water will be discharged to the landfill surface at a rate that allows infiltration into the landfill without running off the landfill.

In the event that in-field conditions limit the use of test pit excavating equipment (*e.g.*, a backhoe), other tools, such as hand augers or shovels, may be used instead. In such instances, Weyerhaeuser's representative will discuss the site conditions with a U.S. EPA representative, if one is available in the field, and will solicit additional ideas for collecting the targeted information. If a U.S. EPA representative is not available in the field, decisions will be made in the field by Weyerhaeuser to collect the targeted information. Weyerhaeuser will document such field modifications.

Quarry/State properties - Delineation of the areal extent and depth of visible paper residuals on the quarry property to the southwest and on the State property to the southeast is needed, in order to support discussions with the owners of these adjacent properties concerning access for future remedial actions. The scope of the investigative work recommended to provide this information for the quarry/State properties is as follows:

- Approximately three test pits (RDTP-08 through RDTP-10) will be excavated on the quarry property, and approximately four test pits (RDTP-04 through RDTP-07) will be excavated on the State property, at the approximate locations shown on Figure 10.
- The test pits are anticipated to be approximately 10 to 15 feet long (perpendicular to the edge of the landfill) and approximately 2 to 4 feet wide. The test pits will be excavated to a maximum depth of 3 feet if no paper residuals are apparent, or to the bottom of visually-identifiable residuals. The depth and lateral extent of residuals in each test pit will be documented in the field by preparing a Test Pit Log (refer to the FSP for a sample log).
- If necessary, additional test pits may be excavated to adequately meet the investigative objectives.

- Equipment used to excavate the test pits will be decontaminated following completion of the work. Decontamination of equipment between test pits is not necessary. Decontamination will be performed at a designated location on the top of the landfill.
- Decontamination water will be discharged to the landfill surface at a rate that allows infiltration into the landfill without running off the landfill.

In the event that in-field conditions limit the use of test pit excavating equipment, other tools, such as hand augers or shovels, may be used instead. In such instances, Weyerhaeuser's representative will discuss the site conditions with a U.S. EPA representative, if one is available in the field, and will solicit additional ideas for collecting the targeted information. If a U.S. EPA representative is not available in the field, decisions will be made in the field by Weyerhaeuser to collect the targeted information. Weyerhaeuser will document such field modifications.

5.4 Leachate Collection System Evaluation

The potential need for either an interim or a long-term leachate collection system within the fill materials as part of the remedial design will be evaluated during the predesign studies for the 12th Street Landfill. The evaluation will consider the presence of perched liquid within the waste; the water content of the waste; the potential for and the effects of settlement following placement of the final cover; the amount of water expected to be generated after placement of the final cover; and the practicability of extracting water from the fill materials.

The existing data (*e.g.*, grain-size analysis, moisture content, and consolidation test results [BBL, 2001]), in conjunction with industry experience at landfills containing similar materials, are sufficient to evaluate the potential need for either an interim or a long-term leachate collection system within the fill materials. No additional field information is needed.

5.5 Quality Assurance Project Plan, Field Sampling Plan, and Health and Safety Plan

As part of the implementation of the Emergency Actions undertaken by Weyerhaeuser in 2007, the U.S. EPA and Weyerhaeuser agreed to develop a Multi-Area QAPP and a Multi-Area FSP for all work to be performed by Weyerhaeuser within the Kalamazoo River Superfund Site. Consequently, the Multi-Area QAPP and the Multi-Area FSP are applicable to all activities conducted by Weyerhaeuser at the 12th Street Landfill, including the predesign field investigations. These documents were initially submitted to the U.S. EPA in June 2007 to support the Emergency Action to remove visible paper residuals/sediment in the former powerhouse discharge channel that is located adjacent to the 12th Street Landfill and to provide erosion protection and a stable slope along the portion of the landfill adjacent to the river (RMT, 2007a, and 2007b, respectively). The Multi-Area QAPP and the Multi-Area FSP were amended in September 2007 to support the Emergency Action to remove visible paper residuals/sediment along the banks of the former Plainwell Mill (RMT, 2007d and 2007e, respectively).

The Multi-Area QAPP has been amended again (Appendix A) and presents the objectives, organization, functional activities, and specific quality assurance (QA) and quality control (QC) activities associated with implementing the predesign field investigations. This Multi-Area QAPP will be modified in the future as other sampling programs are defined (*e.g.*, the short-term and long-term monitoring programs required under the ROD).

The Multi-Area FSP has also been amended (Appendix B) and establishes Standard Operating Procedures (SOPs) for the proposed predesign field investigations. As additional plans are prepared, it is anticipated that they will be incorporated as additional addenda to this document, referencing a combination of the existing SOPs, amended SOPs, and/or additional SOPs.

A Health and Safety Plan (HSP) has been developed to protect field personnel and authorized site visitors during execution of the predesign field investigation (Appendix C). The HSP has been prepared in fulfillment of the requirements that are contained in the CD and the SOW.

Section 6
Design Deliverables

Section III of the SOW defines the scope of the RD activities. The RD activities for the 12th Street Landfill (OU-4) consist of evaluating data and information generated from preceding investigations; conducting and evaluating data from predesign studies; defining detailed design criteria for the landfill cover and the associated erosion protection system; conducting detailed engineering design for the landfill cover and the associated erosion protection system; defining the nature and extent of paper residuals in the woodland, wetlands, and adjacent property; conducting detailed engineering design for the removal of the contaminated materials and the relocation of those materials into the landfill followed by restoration of the excavated areas; evaluating the need for a gas venting system and/or a leachate collection system, and incorporating those findings into the landfill closure design; developing supporting documents for RA implementation; and developing project schedules for implementation.

The SOW states that the RD process be completed in phases:

- Preliminary Design (30 percent complete)
- Intermediate Design (between 30 and 95 percent; only submitted if required by the EPA or if independently submitted by Weyerhaeuser)
- Prefinal Design (95 percent complete)
- Final Design (100 percent complete)

The SOW also requires that the details of these phases, including a specific deliverable schedule, be refined in this RD Workplan. Because the selected remedy has many components of a presumptive landfill cover and in light of the general adequacy of the existing information, the limited scope of information needed from the predesign studies, and to expedite completion of the Remedial Design and Remedial Action, Weyerhaeuser proposes to streamline the design process by consolidating the full design into two deliverables; a draft Design Report for review by the U.S. EPA, and then a final Design Report that addresses the agency's comments. The draft Design Report will include all the components of the final Design Report, including the findings and conclusions for the predesign studies. By reducing the number of design submittals and agency reviews, the remedial design process can be shortened by a year and the construction schedule can then be advanced by a year as well. The proposed schedule is shown on Figure 11.

As required in the SOW, the Design Report will include the following components:

- Presentation and justification for proposed cover system configuration (type of cover materials and layer thickness), including the sidewall containment system

- Identification of the areas and depths of PCB-contaminated residuals outside of the landfill that require excavation and relocation into the landfill
- Plans for the restoration of areas from which contaminated residuals are excavated
- Design details for a landfill gas venting system
- Presentation and justification for a leachate collection system (if needed based on the predesign studies)
- Number and locations of groundwater monitoring wells
- Materials and equipment to implement the remedy
- Performance standards
- Long-term monitoring requirements
- Results of treatability studies (none are planned)
- Results of additional field sampling and predesign work
- Project delivery strategy
- Plans, drawings, and sketches
- Specifications
- Preliminary construction schedule
- Proposed cleanup verification methods, including compliance with Applicable or Relevant and Appropriate Requirements (ARARs)
- Proposed siting/location or process/construction activities
- Real estate, easement, restrictive covenant, and permit requirements
- QAPP, Health and Safety Plan, and Field Sampling Plan
- Draft Operation and Maintenance Plan
- Construction Quality Assurance Project Plan (CQAPP)
- Contingency Plan
- Performance Standards Verification Plan (PSVP)

The Design Report will also describe any additional criteria or features that may be incorporated to accommodate potential future land uses, such as those described in Subsection 2.4.2.

Section 7
Schedule

The schedule of completion for each activity included under the RD and the submission dates of deliverables, including critical path milestones for each activity, are included in the attached project schedule (Figure 11). Although U.S. EPA document review and approval times are uncertain, estimates have been included in this schedule.

Section 8
Project Management

8.1 Project Team

Jennifer Hale will serve as Weyerhaeuser's project manager for the OU-4 RD/RA. She will maintain overall responsibility for the project and will serve as the primary point-of-contact for the U.S. EPA.

RMT's project manager for RD/RA activities will be Linda Hicken. She will provide day-to-day coordination of RMT's project team and will serve as RMT's point-of-contact for RD/RA activities at the 12th Street Landfill.

Michael Amstadt will be the professional engineer of record for the RD/RA. He will provide senior engineering oversight and direction. Eric Watruba will be the project engineer responsible for the development of plans, specifications, and other technical deliverables. Kent Nilsson will provide senior engineering oversight of the geotechnical components of the landfill grading and cover design.

John Rice will be the senior hydrologist/hydrogeologist responsible for the geologic and hydrogeologic aspects of the project.

Kathy Huibregtse will serve as the Principal-in-Charge for RMT and will provide overall review of all submittals to the agency and coordination of activities with work being conducted under the Emergency Response activities and at other operable units.

8.2 Data Management Plan

Procedures for data management have been established to document and track project analytical data, documents, and computer files as they are generated, reviewed, and finalized.

8.2.1 Database Management

Data associated with the 12th Street Landfill will be managed in an electronic database, the format of which is compatible with Microsoft® Access software. The data management coordinator will perform a quality control (QC) check on the data and will have sole responsibility for maintenance and updates to the database. The database will be placed into project-specific subdirectories on RMT's computer network, where authorized personnel may access the data.

8.2.2 Document Control

Data and documents originating in the field (*e.g.*, chain-of-custody documents, overnight carrier shipping records, field notes, and field-generated data) will be placed in a project file. The data management coordinator will be responsible for storing the reports in a secure location.

8.2.3 Document Retention

Until 10 years after receipt of the U.S. EPA's Certificate of Completion of the Work, Weyerhaeuser will preserve and retain records and documents that relate to liability under CERCLA with respect to the 12th Street Landfill and the performance of activities required by the Consent Decree. RMT will preserve records and documents for the same period of time. At the conclusion of the document retention period, Weyerhaeuser will notify the U.S. EPA 90 days prior to the destruction of any such records or documents (Consent Decree, Section XXVIII).

8.3 Periodic Reporting

Weyerhaeuser will prepare and submit periodic progress reports. As required by the SOW, progress reports will be submitted to the U.S. EPA remedial project manager (RPM) and the State monthly during construction periods and quarterly during other periods, until the U.S. EPA issues a Certificate of Completion, or until the U.S. EPA notifies Weyerhaeuser that less frequent reporting is appropriate. The progress reports will include the following information:

- Actions that have been taken toward achieving compliance with the Consent Decree during the previous period
- A summary of results of sampling and tests and other validated data received or generated in the previous period
- Workplans, plans, and other deliverables required by the Consent Decree completed and submitted during the previous period
- Actions that are scheduled for the next 6 to 12 weeks and other information regarding progress as specified in the Consent Decree
- Information regarding percentage completion, and information regarding delays as specified in the Consent Decree
- Any modifications to the workplans or other schedules that have been approved by the U.S. EPA
- Activities undertaken in support of the community relations' plan during the previous quarter and those to be undertaken in the next 6 to 12 weeks (Consent Decree, Section XII).

8.4 Data Submittals/Reporting to U.S. EPA

Documents, including design deliverables and progress reports, approvals, and other correspondence to be submitted in accordance with this RD workplan, will be sent by either e-mail, certified mail, or overnight carrier, to the following addresses. All notices and submissions will be considered effective upon receipt, unless otherwise provided in the Consent Decree (Consent Decree, Section XXVI):

- Documents to be submitted to the U.S. EPA will be sent to:

  Mr. Michael Berkoff
  Remedial Project Manager
  United States Environmental Protection Agency - Region 5
  77 W. Jackson Blvd, SR-6J
  Chicago, IL 60604
  E-mail: berkoff.michael@epa.gov

- Documents to be submitted to the State of Michigan will be sent to:

  Mr. Paul Bucholtz
  Environmental Response Division
  Michigan Department of Environmental Quality
  Constitution Hall
  525 West Allegan Street
  P.O. Box 30426
  Lansing, MI 48909-7926
  E-mail: bucholtp@michigan.gov

- Documents to be submitted to Weyerhaeuser will be sent to:

  Ms. Jennifer Hale
  Environmental Manager
  Weyerhaeuser Company
  Mail Stop: WTC-2G2
  P.O. Box 9777
  Federal Way, WA 98063-9777
  (Street address: 32901 Weyerhaeuser Way South, Federal Way, WA 98001)
  E-mail: jennifer.hale@weyerhaeuser.com

- Documents to be submitted to RMT will be sent to:

  Ms. Linda Hicken
  Project Manager
  RMT, Inc.
  744 Heartland Trail
  Madison, WI 53717
  E-mail: linda.hicken@rmtinc.com

These addresses may be changed by either RMT or the U.S. EPA by written request of either party.

As described in Section 6, Weyerhaeuser proposes to streamline the design process by submitting a draft Design Report for review by the U.S. EPA, and addressing the agency's comments in the final Design Report. By reducing the number of design submittals and agency reviews, the remedial design process can be shortened by a year. Consequently, Weyerhaeuser plans to submit the following major preconstruction deliverables as part of the RD/RA process:

- Draft Design Report

- Final Design Report
- Draft Remedial Action Workplan

Weyerhaeuser will submit three copies of plans, reports, and other data required in this RD workplan to the U.S. EPA. Weyerhaeuser will submit two copies of such plans to the State. All project meetings will be jointly agreed upon and coordinated by the U.S. EPA, Weyerhaeuser, and RMT.

Section 9
References

Blasland & Bouck (B&B). 1992. Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site, description of the current situation. Kalamazoo River Study Group. July 1992.

Blasland & Bouck (B&B). 1998. Memorandum regarding Plainwell Dam failure analysis, from Michael J. Shivell to Douglas K. Cowin. Project #645.90.017. November 12, 1998.

Blasland & Bouck (B&B). Geotechnical sample analytical data, 12th Street Landfill Operable Unit. Transmittal letter with attachments. June 25, 2001.

Camp Dresser & McKee (CDM). 2002. Michigan Department of Environmental Quality, Kalamazoo River and Portage Creek wetland delineation study. January 2002.

Camp Dresser & McKee (CDM). 2004. Dam safety inspection report, Plainwell Dam Number 1, ID #00491. July 12, 2004.

Geraghty and Miller (G&M). 1991. 12th Street Landfill geophysical investigation, Plainwell, Michigan. Letter report. October 11, 1991.

Geraghty and Miller (G&M). 1994a. Test pit investigation, technical memorandum, 12th Street Landfill Operable Unit, Plainwell, Michigan, Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site. February 18, 1994.

Geraghty and Miller (G&M). 1994b. Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site remedial investigation, technical memorandum 8, 12th Street Landfill Operable Unit, Plainwell, Michigan. May 31, 1994.

Geraghty and Miller (G&M). 1996a. Remedial investigation addendum I, 12th Street Landfill Operable Unit, Plainwell, Michigan, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site. March 26, 1996.

Geraghty and Miller (G&M). 1996b. Remedial investigation report, 12th Street Landfill Operable Unit, Plainwell Michigan, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site. December 20, 1996.

Geraghty and Miller (G&M). 1997. Focused feasibility study, 12th Street Landfill Operable Unit, Plainwell, Michigan, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site. July 1997.

Plainwell Paper Co., 1987. Historical waste water disposal practices. Summary prepared by George Lawton of Plainwell Paper Company. EPA File No. 179031. June 3, 1987.

Natural Resources Conservation Service. 2008. Soil survey of Allegan County, Michigan. http://websoilsurvey.nrcs.usda.gov. Web site visited on February 7, 2008.

RMT, Inc. 2007a. Multi-Area quality assurance project plan, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site. Revision 00. June 2007.

RMT, Inc. 2007b. Draft multi-area field sampling plan, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, OU-4: Emergency action at the 12th Street Landfill former powerhouse discharge channel, Plainwell, Michigan. Revision 0. June 2007.

RMT, Inc. 2007c. Emergency response plan design report, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site. July 2007.

RMT, Inc. 2007d. Multi-area quality assurance project plan, addendum 1: former Plainwell Mill banks emergency response action, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site. September 10, 2007.

RMT, Inc. 2007e. Multi-area field sampling plan, Addendum 1: former Plainwell Mill banks emergency response action, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site. September 10, 2007.

U.S. EPA. 2004. Final data summary report, soil/sediment sampling results, predesign sampling, 12th Street Landfill, Operable Unit #4, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site. July 2004.

U.S. EPA. 2007a. Administrative settlement agreement and order on consent for removal action, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site. Docket number V-W-07-C-863. February 21, 2007.

U.S. EPA. 2007b. Letter from the U.S. EPA authorizing Weyerhaeuser to conduct an emergency action at the 12th Street Landfill. August 1, 2007.

Table 2-1
History of Ownership of the Plainwell Mill and the 12th Street Landfill

TIME PERIOD	OWNER
1886-1956	Michigan Paper Company (possibly only the mill until approximately 1955)
1956-1961	Michigan Division of Hamilton Paper
1961-1971	Weyerhaeuser Company
1971-1975	Nicolet Paper Company, known as Plainwell Paper Company
1975-1985	Plainwell Paper Company, under ownership by Philip Morris, Inc., and Philip Morris Industrial, Inc.
1985-1987	Chesapeake Corporation
1987-1998	Simpson Plainwell Paper Company
1998-present	Plainwell, Inc.

Source: 12th St. Landfill ROD

Table 4-1
Summary of Existing Data
12th Street Landfill (OU-4)

AREA/MEDIUM	PREVIOUS INVESTIGATIONS/SAMPLING	DETAILS OF INVESTIGATION	RESULTS/CONCLUSIONS RELEVANT TO RD	COMMENTS/ DATA LIMITATIONS FOR USE IN RD
Residuals within the landfill footprint	▪ Sixteen test pits (TP-1 through TP-16) (G&M 1994a)	▪ Depths range from 9 to 20 feet.	▪ Bailing wire and construction debris were found in large quantities in the southern portion of the landfill. ▪ The retaining berm consists of fly ash overlain by sand. ▪ Residuals extend laterally 60 feet beyond the berm on the northern and western sides of landfill. ▪ The soil/sand/fly ash cover on the landfill ranges from 2 to 7 feet thick. This is in contrast to the 1-to 7-foot–thick cover, as stated in G&M, 1996b. ▪ Perched leachate is present within the residuals. ▪ The residuals within the landfill are approximately 25 feet thick at the thickest location (in the central portion of the landfill near GMSB-7 and GMSB-4).	▪ Data are useful for developing cross sections of landfill area. ▪ Peat deposits underlie portions of the landfill. ▪ No survey coordinates are available for test pits.
	▪ Seven exploratory soil borings (GMSB-1 through GMSB-7) (G&M, 1994b)	▪ Depths range from 18 to 28 feet. ▪ Three borings were converted to leachate head wells (LH-1 through LH-3). ▪ Five borings penetrate the base of the residuals.		
	▪ Nine borings for monitoring wells (MW-1 through MW-5B) (G&M 1994b)	▪ Depths range from 10 to 26 feet. ▪ The thickness of the residuals range from 1.5 feet to 6.5 feet.	▪ PCB concentrations in residuals around the toe of the landfill range from 5.1 to 28.6 mg/kg.	▪ Monitoring wells were installed inside the toe of the landfill, at the direction of MDNR (G&M, 1994b). ▪ Some PCB data are available for soil beneath residuals, but the soil samples were composited over 1- to 2-foot depth intervals.
	▪ Ten geotechnical soil borings (A through J) (BBL, 2001)	▪ Depths range from 12 to 30 feet. ▪ Three borings are within retaining berms, five are within residuals, and two are at the edge of residuals. ▪ Geotechnical testing data include moisture content (21 samples), specific gravity (11 samples), organic content (6 samples), bulk density (6 samples), grain size (12 samples), Atterberg limits (6 samples), consolidation (4 samples), unconsolidated undrained (UU) triaxial (4 samples), vane shear (8 samples).		▪ Residuals typically have soft consistency. Berm materials (sand, fly ash and residuals) typically have loose density. ▪ Vane shear test results indicate that residuals have sensitivity ranging from 3 to 6 (there is a strength loss from undisturbed to remolded condition). ▪ Moisture conditions of soil and residuals are not typically noted on the boring logs. ▪ No survey coordinates are available for borings ▪ Available data should be sufficient for geotechnical design calculations, and to assess the potential for leachate generation during consolidation.

Table 4-1 (continued)
Summary of Existing Data
12th Street Landfill

AREA/MEDIUM	PREVIOUS INVESTIGATIONS/SAMPLING	DETAILS OF INVESTIGATION	RESULTS/CONCLUSIONS RELEVANT TO RD	COMMENTS/ DATA LIMITATIONS FOR USE IN RD
Residuals within the landfill footprint (*continued*)	▪ Twenty-six Geoprobe® borings along six transects (T1-01 through T6-04) (RMT, 2007c)	▪ Depths range from 12 to 25 feet. ▪ Geoprobe® borings were installed on the eastern area of the landfill adjacent to the Kalamazoo River channel, the MDNR property, and the wetland to the north. ▪ Geoprobe® borings were sampled continuously and logged by the on-site scientist.	▪ No buried containment berm was found during the investigation. If a berm had been placed, the berm was a mixture of materials similar to, and not easily distinguishable from, the paper residuals which it was to retain. ▪ No discernible material of different grain size, moisture content, consistency, or strength was identified beyond the typical range of materials found in the landfill.	▪ Transects of Geoprobe® borings were used to develop cross sections of the eastern area of the landfill adjacent to the Kalamazoo River channel, the MDNR property, and the wetland to the north. ▪ Because no berm was located, the results of the landfill material testing completed by BBL (2001) on the entire landfill were used for input into slope stability calculations for the Emergency Action performed by Weyerhaeuser in 2007 (RMT, 2007c).
Wetland and woodland areas surrounding the landfill	▪ Fourteen hand auger "delineation" borings (DB-1 through DB-14) (G&M 1994b)	▪ Depth of borings were not reported. ▪ Borings are in pairs around the perimeter of the landfill, with one of each pair within the residuals (the inner ring) and one outside the edge of the residuals (the outer ring). ▪ Reportedly, residuals samples were collected from near the base of the residuals and analyzed for PCBs. ▪ Reportedly, soil below the residuals was analyzed for PCBs.	▪ PCB concentrations in residuals range from 3.7 to 158J mg/kg.	▪ This series of borings was not visually logged. From Table 2-2 and Figure 3.1 of G&M, 1994b, one can infer residuals were encountered in the inner ring of DB- borings and not encountered in the outer ring of DB- borings, but the depth to the base of the residuals was not established. ▪ The depth of PCB samples from some of the DB- borings was not recorded. ▪ Conclusions about PCB concentrations in soil below the residuals are uncertain.

Table 4-1 (continued)
Summary of Existing Data
12th Street Landfill

AREA/MEDIUM	PREVIOUS INVESTIGATIONS/SAMPLING	DETAILS OF INVESTIGATION	RESULTS/CONCLUSIONS RELEVANT TO RD	COMMENTS/ DATA LIMITATIONS FOR USE IN RD
Wetland and woodland areas surrounding the landfill (*continued*)	▪ Fifty 2-foot deep hand auger/drive-tube borings (FP-01 through FP-34, and EXP-01 through EXP-16) (U.S. EPA, 2004)	▪ A total of 159 soil/residual samples were collected from 50 locations. ▪ Samples were collected from 0-6, 6-12, and 12-24 inches below grade.	▪ PCB concentrations in residuals-only samples range from 0.5 mg/kg to 38.7 mg/kg. PCB concentrations in samples of mixed soil/residuals range from nondetect to 13.7 mg/kg. ▪ Approximate volumes of PCB-contaminated soil and sediment were reported as follows: – 12,300 CY with PCB conc. > 0.6 mg/kg – 3,300 CY with PCB conc. > 4 mg/kg – 1,500 CY with PCB conc. > 8 mg/kg – 150 CY with PCB conc. > 23 mg/kg ▪ The area requiring excavation and deposition into the landfill is reportedly the soil/residuals within the wetlands along the northern and western boundaries of the landfill extending less than 100 feet from the landfill.	▪ Soil borings only advanced to a 2-foot depth, even if residuals were encountered at the base of the boring. The depth to the base of the residuals was not determined. ▪ Of the 13 locations with visible residuals, nine have residuals present at the base of the borehole. The depth to the base of the residuals has not been established. ▪ Reported volumes for excavation and placement into the landfill were calculated using PCB concentration data only, and do not correlate with visible criteria (*i.e.,* no distinction made between residuals and PCB-containing native soil during volume calculation). ▪ Property to the southwest (quarry) was not investigated due to access issues. ▪ Woodland area to the southeast may require further sampling to delineate contamination
	▪ Five borings for monitoring wells (MW-6A through MW-8B) (G&M, 1994b)	▪ Depths range from 14 to 48 feet.	▪ No residuals were encountered.	
	▪ Two wetland assessments (G&M, 1994b and CDM, 2002)	▪ Both included desktop and field assessments.	▪ Approximate edge of wetland is shown on Figure 5 of this document, based on Figure 2.2 of G&M, 1994b. ▪ National Wetland Inventory map is accurate in project location.	▪ The text of G&M 1994b indicates that ponded water and inundation of the land surface were observed; however, the wetland characterization tables in Appendix F of the same report note that soil was saturated to the surface (but not ponded water). A similar discrepancy is found in CDM 2002.

Table 4-1 (continued)
Summary of Existing Data
12th Street Landfill

AREA/MEDIUM	PREVIOUS INVESTIGATIONS/SAMPLING	DETAILS OF INVESTIGATION	RESULTS/CONCLUSIONS RELEVANT TO RD	COMMENTS/ DATA LIMITATIONS FOR USE IN RD
Sediment in former powerhouse discharge channel (since removed as part of the Emergency Action in 2007)	▪ Two grab samples of residuals on river bed (SD-1 and SD-2) (G&M, 1994b)	▪ Residuals were identified on the riverbed approximately 5 feet from the landfill berm. Two grab samples were collected approximately 3 feet from each other.	▪ Total PCB concentrations were 17 mg/kg and 29 mg/kg.	▪ No survey locations are available for samples.
	▪ Twenty-three sediment cores (1 though 26; no core numbered 22, 23, and 24) (U.S. EPA, 2004)	▪ Sampling grid was 20 feet perpendicular to channel and 50 feet parallel to channel, extending 60 feet into channel from west bank, and 250-300 feet along the east side of landfill. ▪ Core depth was a maximum 2.7 feet, but typically less than 1 foot deep. Samples were collected from a maximum depth of 1 foot. ▪ Sample cores visibly contaminated with paper residuals were not analyzed. It was assumed that those residuals would exceed cleanup criteria. ▪ Twenty-eight samples analyzed for PCBs.	▪ Total PCB concentrations ranged from nondetect to 34 mg/kg. ▪ The highest concentration of 34 ppm was located at a depth interval 0.5-0.7 feet, approximately 60 feet from bank near northeastern corner of landfill. Sample was identified as gray silty clay with strong diesel odor. ▪ Four samples, each from approximately 20 feet away from shore, reportedly contained obvious residuals that are contiguous/part of landfill (based on a handwritten note in Appendix 3 of U.S. EPA, 2004).	▪ Results are poorly documented. Results are summarized in Appendix 3 of U.S. EPA, 2004. ▪ Core descriptions are provided, but no clear visible distinction is made between residuals and river sediment.
	▪ Sixteen drive-tube core samples (SD-01 though SD-16); (U.S. EPA, 2004)	▪ Thirty-four sediment samples were collected from 16 locations. ▪ Samples were collected from 0-6 inches and 6-12 inches. ▪ All samples were analyzed for PCBs, only.	▪ Concentrations of PCBs found in the former discharge channel ranged from 0.016 mg/kg to 7.7 mg/kg, with a reported average concentration of 0.44 mg/kg. ▪ Residuals appear to have entered the channel through erosion of the landfill, but potential surface water flow around the northern end of the eastern bank of the discharge channel may also be a source of low-level PCBs.	▪ Borings through sediment in the former powerhouse discharge channel do not visually identify residuals (as opposed to river sediment). ▪ PCBs in the sediment in the channel are derived from multiple sources (the 12th Street Landfill is downstream of the three other landfill operable units of the Kalamazoo River Superfund Site). Cannot differentiate which sediment may have emanated from the 12th Street Landfill.

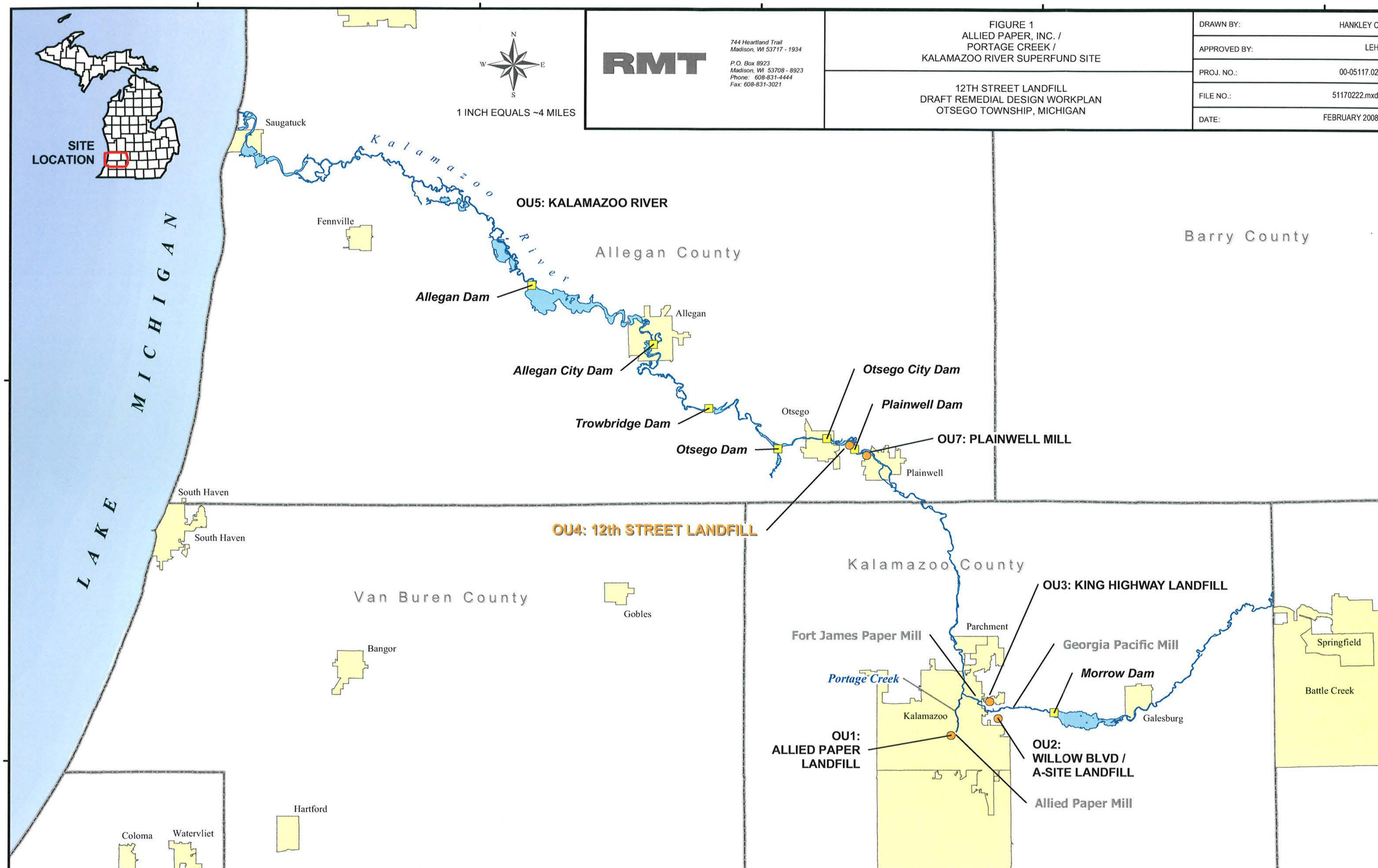
Table 4-1 (continued)
Summary of Existing Data
12th Street Landfill

AREA/MEDIUM	PREVIOUS INVESTIGATIONS/SAMPLING	DETAILS OF INVESTIGATION	RESULTS/CONCLUSIONS RELEVANT TO RD	COMMENTS/ DATA LIMITATIONS FOR USE IN RD
Groundwater/Leachate	▪ Fifteen monitoring wells (MW-2A/MW-2B through MW-8A/MW-8B and MW-1) along the circumference of landfill (G&M, 1994b)	▪ Eight borings were converted to monitoring wells, seven converted to piezometers. The "A" series of wells are shallow. ▪ Water level measurements were available from August, September, and December 1993, as well as August 1995. ▪ GW and leachate samples were analyzed for TCL, TAL, COD, TSS, TOC, nitrate, chloride, sulfate, alkalinity, and PCBs. ▪ Hydraulic conductivity tests were conducted at 10 monitoring well locations.	▪ PCBs were not detected in unfiltered samples of groundwater. ▪ Aroclor-1242 was detected in one of three unfiltered leachate samples at a concentration of 0.0014 mg/L. ▪ The upper portion of the aquifer consists of sand and gravel. Shallow groundwater is in direct hydraulic connection with the river. ▪ The Plainwell Dam has a major influence on groundwater flow. Surface water in the river flows from the upstream side of the dam into the groundwater system of the surficial aquifer, and then flows beneath the landfill, and then back into the river on the downstream side of the dam. ▪ One SVOC, bis(2-ethylhexyl)phthalate, was found in the groundwater sample from MW-3A. ▪ Slug test data indicate a hydraulic conductivity of 1.2×10^{-1} cm/s to 5.3×10^{-3} cm/s in the surficial aquifer.	▪ Monitoring wells were installed inside the landfill footprint, with the exception of MW-6A, MW-6B, MW-7A, MW-7B, MW-8A, and MW-8B. ▪ The current condition of the existing wells is unknown. ▪ Bis(2-ethylhexyl)phthalate is a common laboratory contaminant.
Surface water	▪ Two river gauges installed during RI (G&M, 1994b).	▪ One gauge was installed on the upstream side of the Plainwell Dam, and one on the downstream side. ▪ Water level measurements are available from August, September, and December 1993, as well as August 1995.	▪ Data were used to establish groundwater flow patterns and the hydraulic relationship of river and groundwater.	▪ Data are only available from a few monitoring rounds. ▪ No surveyed locations are available for gauges.

Table 4-2
Monitoring Well Construction Data
12th Street Landfill

WELL	ELEVATION DATA (FT. ABOVE MEAN SEA LEVEL)			
	GROUND SURFACE	TOP OF CASING	TOP OF SCREEN	BOTTOM OF SCREEN
Wells Located Inside the Footprint of the Landfill				
MW-1	706.2	708.71	698.97	693.97
MW-2A	704.9	707.31	700.45	690.45
MW-2B	704.1	706.97	684.69	679.69
MW-3A	702.3	704.25	697.75	692.75
MW-3B	702.5	704.54	688.02	683.02
MW-4A	703.7	706.01	699.44	694.44
MW-4B	703.6	705.61	690.17	685.17
MW-5A	702.1	704.07	699.61	689.61
MW-5B	702.3	704.18	685.04	680.04
Wells Located Outside the Footprint of the Landfill				
MW-6A	708.3	710.33	704.83	694.83
MW-6B	708.2	710.21	689.38	684.38
MW-7A	707.7	709.92	704.38	694.38
MW-7B	708.1	710.82	688.74	683.74
MW-8A	733.2	734.96	706.15	696.15
MW-8B	733.0	734.89	690.16	685.16

Notes:
All wells are 2-inch–diameter stainless-steel wells, with 2-inch #316 stainless 10-slot screens.
Filter pack material for all wells is 00-size Morie sand.



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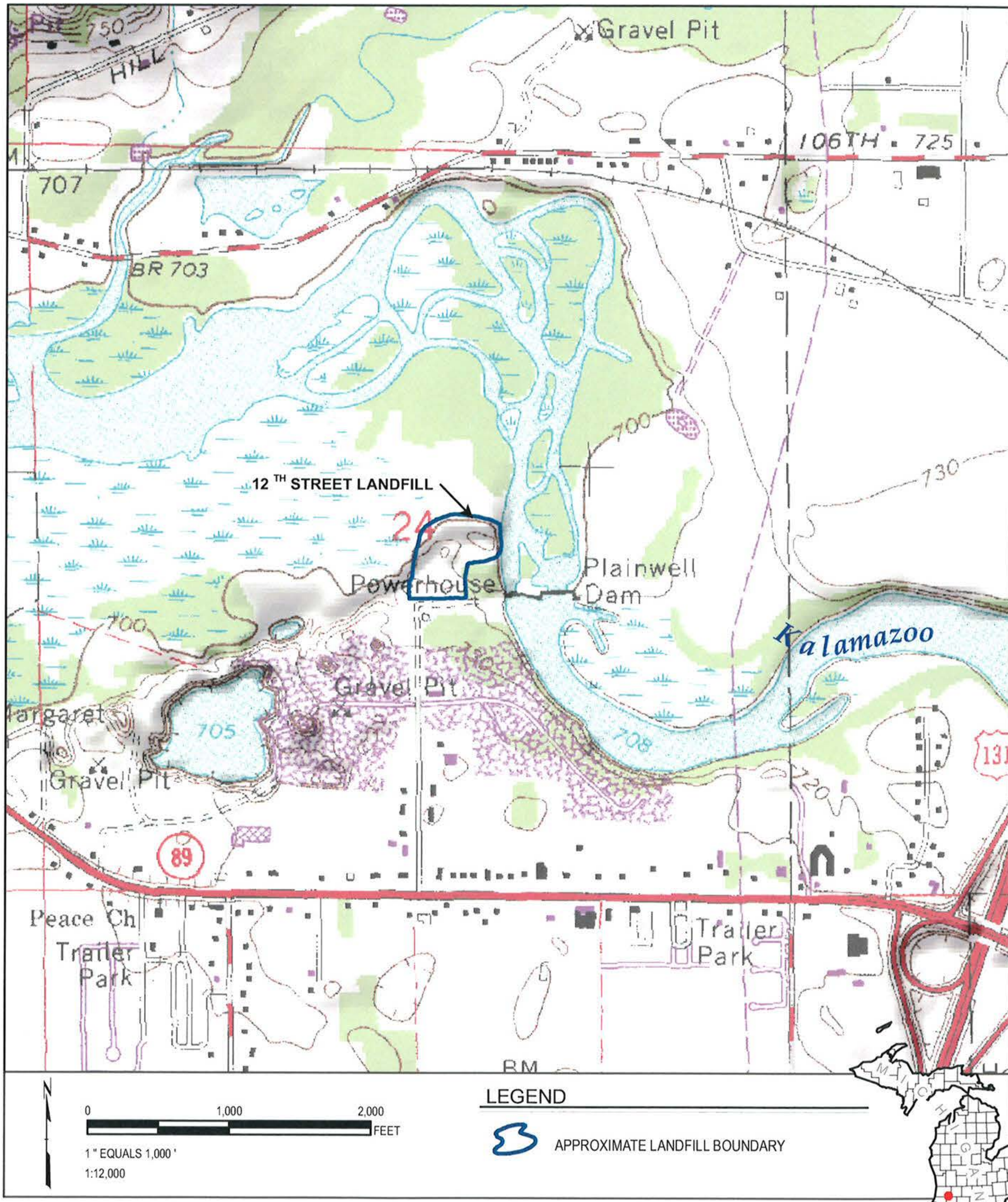

0 | 1,000 | 2,000 FEET

1 " EQUALS 1,000 '

1:12,000

LEGEND

APPROXIMATE LANDFILL BOUNDARY

RMT

744 Heartland Trail
Madison, WI 53717-1934

P.O. Box 8923 53708-8923
Phone: 608-831-4444
Fax: 608-831-3334

12TH STREET LANDFILL
DRAFT REMEDIAL DESIGN WORKPLAN
OTSEGO TOWNSHIP, MICHIGAN

SITE LOCATION MAP

DRAWN BY:	HANKLEY C
APPROVED BY:	LEH
PROJECT NO:	00-05117.04/ERD
FILE NO.	51170223.mxd
DATE:	FEBRUARY 2008

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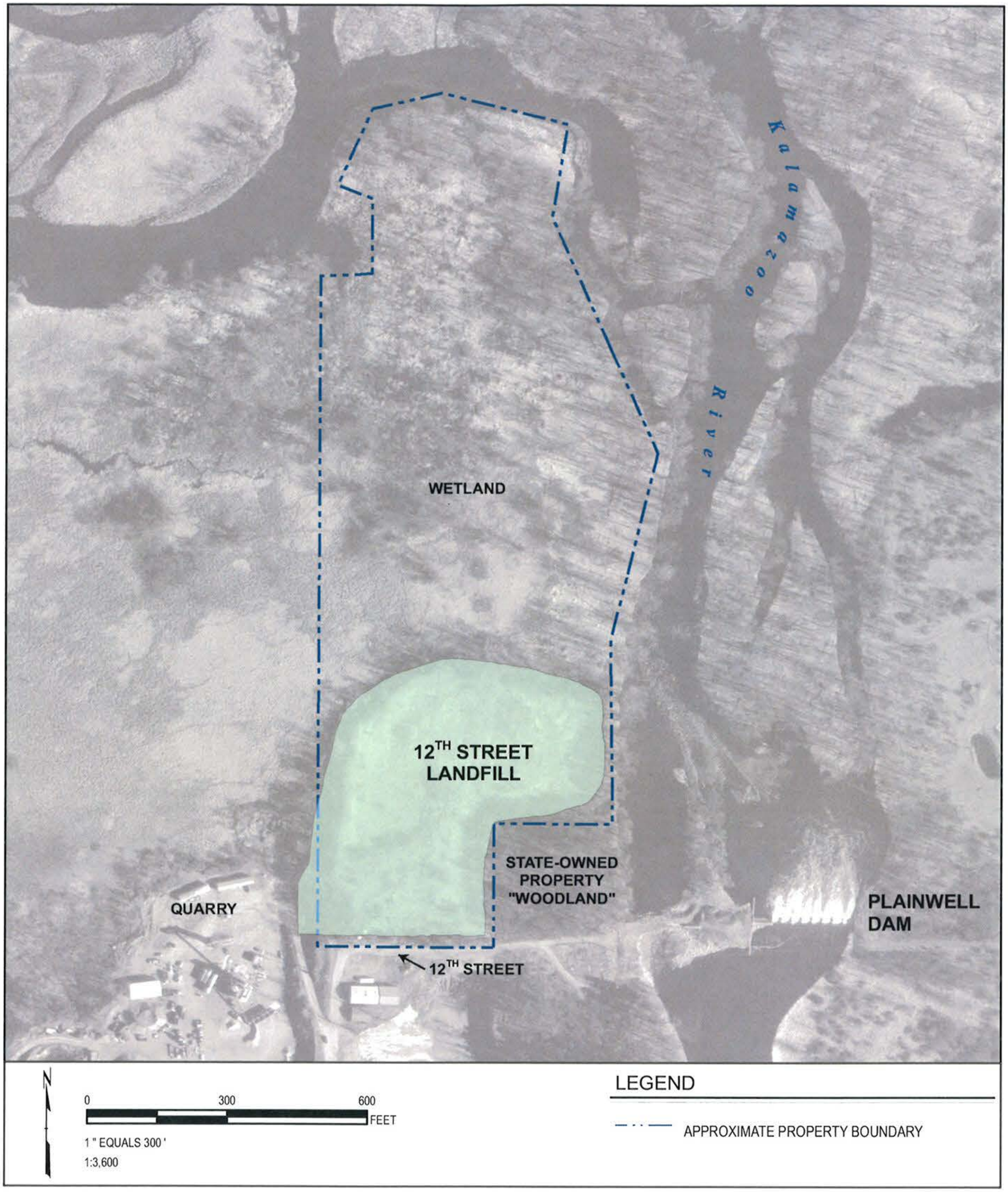
FIGURE 2



RMT
744 Heartland Trail
Madison, WI 53717-1934
P.O. Box 8923 53708-8923
Phone: 608-831-4444
Fax: 608-831-3334

12TH STREET LANDFILL
DRAFT REMEDIAL DESIGN WORKPLAN
OTSEGO TOWNSHIP, MICHIGAN

GENERAL SITE LAYOUT

DRAWN BY:	HANKLEY C
APPROVED BY:	LEH
PROJECT NO:	00-05117.02
FILE NO.	51170224.mxd
DATE:	FEBRUARY 2008

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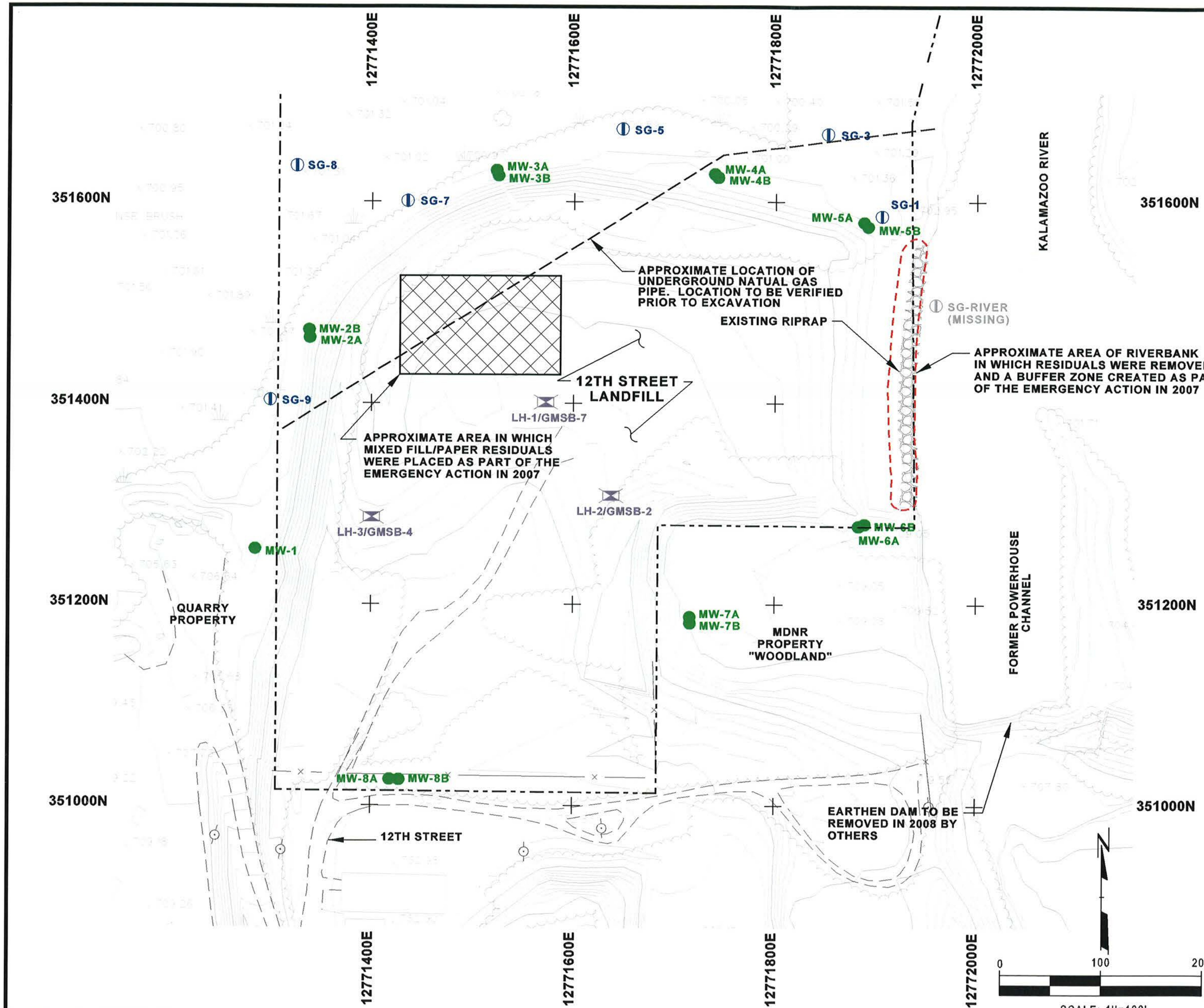
FIGURE 3



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- GRID LOCATION
- EXISTING UNPAVED ROAD
- EXISTING FENCE
- EXISTING BUILDING
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING SPOT ELEVATION
- EXISTING TREES AND/OR BRUSH
- EXISTING WETLAND
- EXISTING OVERHEAD ELECTRIC
- MW-1 EXISTING MONITORING WELL
- SG-3 EXISTING STAFF GAUGE
- LH-1/GMSB-7 EXISTING LEACHATE HEADWELL

NOTES

1. BASE TOPOGRAPHY PROVIDED BY OAS, INC. OF SEYMOUR, INDIANA BASED ON AERIAL SURVEY DATED 3/30/2005. UPDATED TOPOGRAPHY FOR THE 12TH STREET LANDFILL WAS PROVIDED BY HOLLAND ENGINEERING, INC. SURVEY DATE: DECEMBER 6, 2007.
2. COORDINATES ARE MICHIGAN STATE PLANE-SOUTH ZONE. THE VERTICAL DATUM IS NGVD 29.
3. PROPERTY BOUNDARY BASED ON LEGAL DESCRIPTION PROVIDED BY U.S.EPA ON MARCH 30, 2004. COORDINATES FOR S 1/4 CORNER AND N 1/4 CORNER OF SECTION 24 AND NORTH BEARING USED TO PLOT PROPERTY LINE WERE PROVIDED BY HOLLAND ENGINEERING AND ARE BASED ON MICHIGAN STATE PLANE - SOUTH ZONE COORDINATES.

PROJECT: **12TH STREET LANDFILL DRAFT REMEDIAL DESIGN WORKPLAN OTSEGO TOWNSHIP, MICHIGAN**

SHEET TITLE: **EXISTING CONDITIONS**

DRAWN BY: stormerl	SCALE: 1"=100'	PROJ. NO. 5117.02 \ RDW	
CHECKED BY: ECW		FILE NO. EXISTING.PLT	
APPROVED BY: LEH	DATE PRINTED:	FIGURE 4	
DATE: FEBRUARY 2008			

RMT

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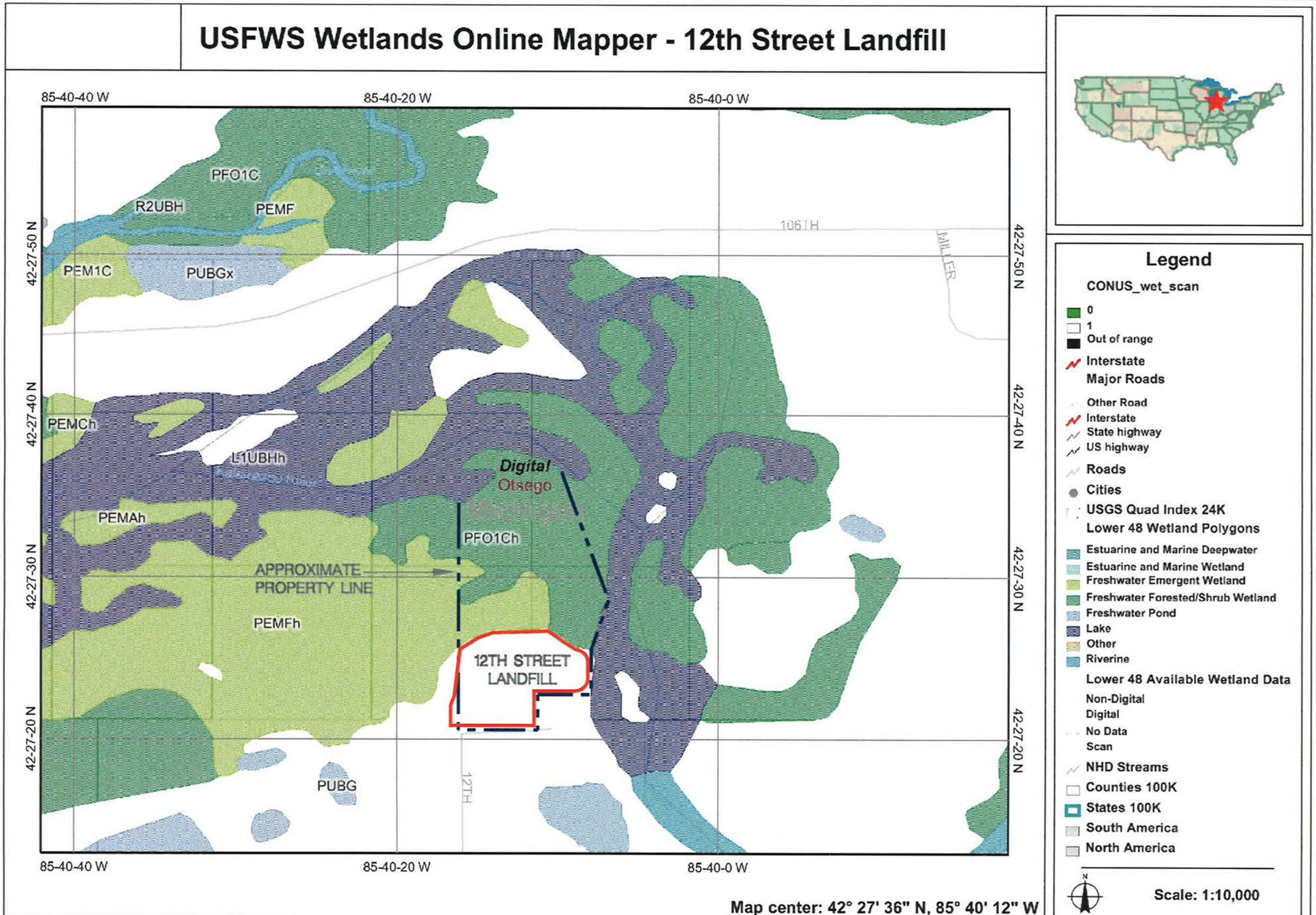
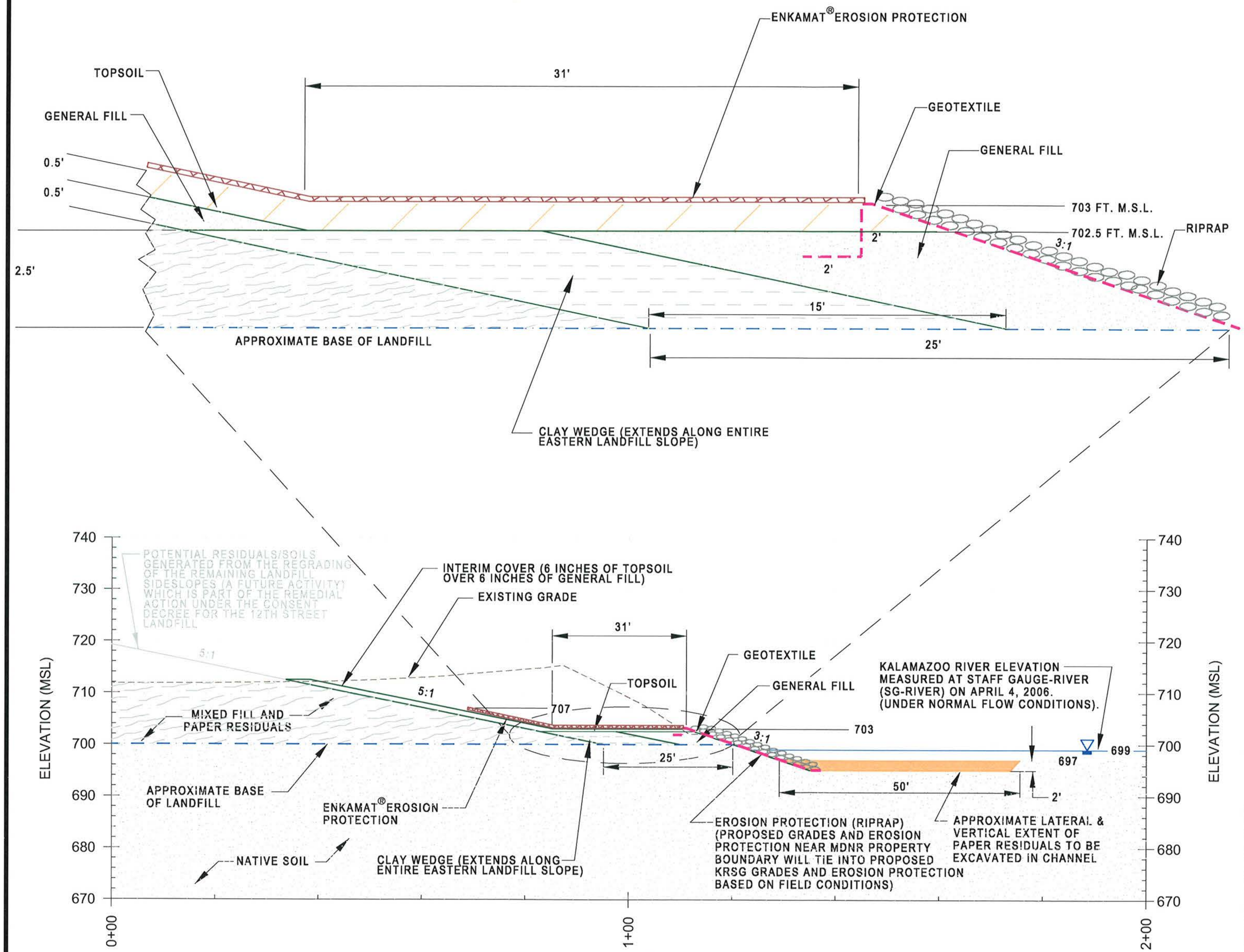
USFWS Wetlands Online Mapper - 12th Street Landfill

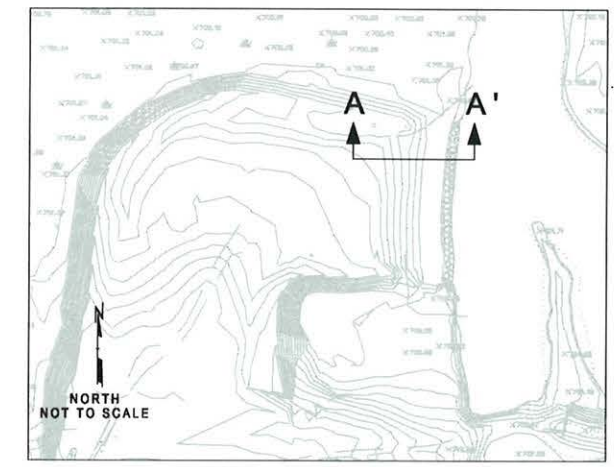


This map is a user generated static output from an Internet mapping site and is for general reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. THIS MAP IS NOT TO BE USED FOR NAVIGATION.

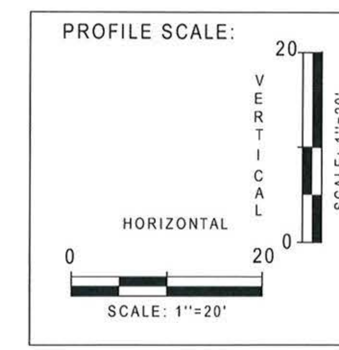
FIGURE 5



CROSS SECTION A-A'
(LOOKING NORTH)



CROSS SECTION LOCATOR



PROJECT: 12TH STREET LANDFILL DRAFT REMEDIAL DESIGN WORKPLAN OTSEGO TOWNSHIP, MICHIGAN		
SHEET TITLE: CROSS SECTION A-A'		
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CHECKED BY: ECW	AS SHOWN	FILE NO. XSECTION.DWG
APPROVED BY: LEH	DATE PRINTED:	FIGURE 6
DATE: FEBRUARY 2008		

RMT

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Phone: 608–831–4444

PLOT DATA
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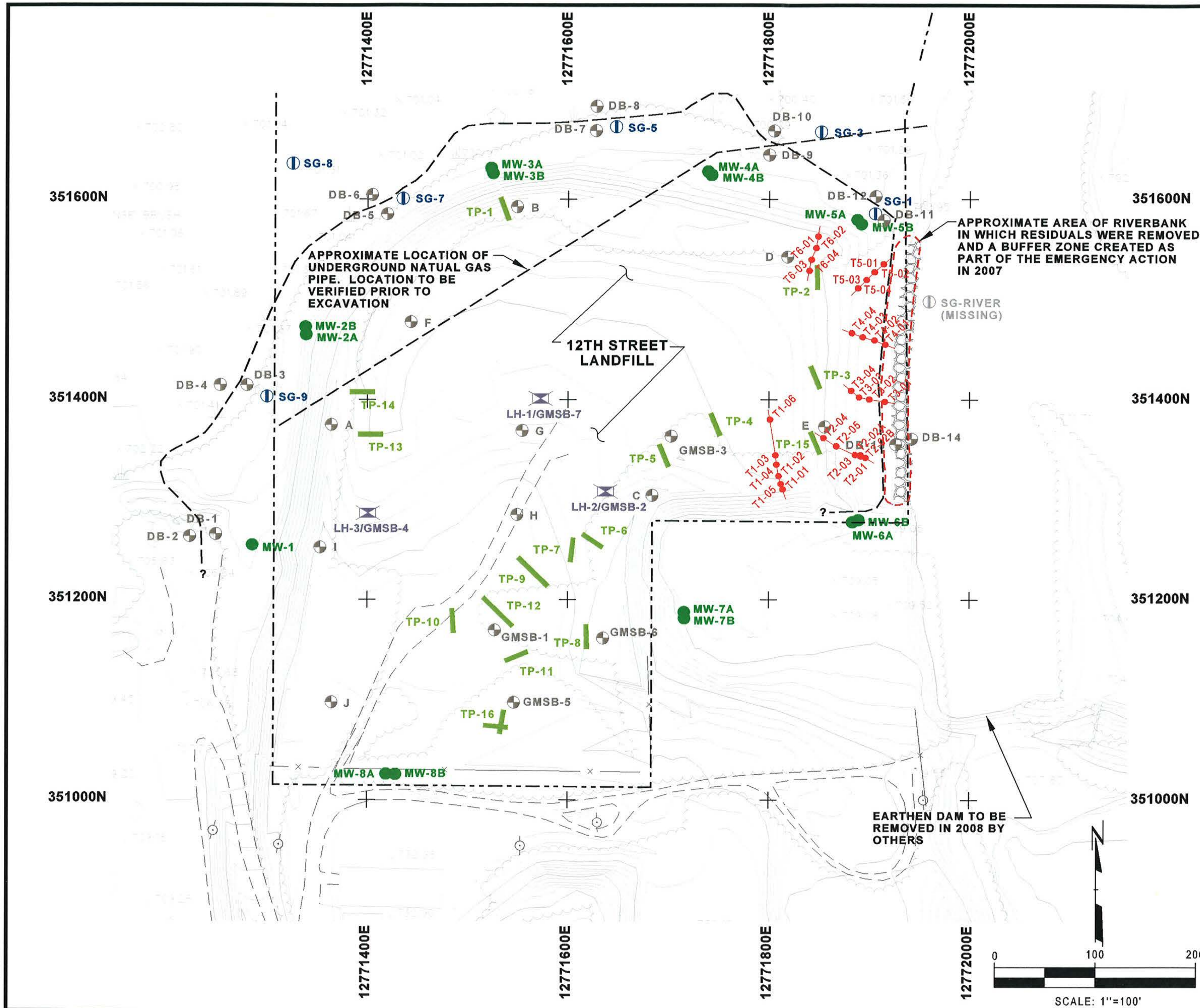
Operator Name: x
Scale: x



LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- GRID LOCATION
- EXISTING UNPAVED ROAD
- EXISTING FENCE
- EXISTING BUILDING
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING SPOT ELEVATION
- EXISTING TREES AND/OR BRUSH
- EXISTING WETLAND
- EXISTING OVERHEAD ELECTRIC
- APPROXIMATE LIMITS OF VISIBLE PAPER RESIDUALS
- MW-1 EXISTING MONITORING WELL
- SG-3 EXISTING STAFF GAUGE
- LH-1/GMSB-7 EXISTING LEACHATE HEADWELL
- TP-14 FORMER TEST PIT
- T5-01 FORMER GEOPROBE BORING
- C FORMER SOIL BORING

NOTES

1. BASE TOPOGRAPHY PROVIDED BY OAS, INC. OF SEYMOUR, INDIANA BASED ON AERIAL SURVEY DATED 3/30/2005. UPDATED TOPOGRAPHY FOR THE 12TH STREET LANDFILL WAS PROVIDED BY HOLLAND ENGINEERING, INC. SURVEY DATE: DECEMBER 6, 2007.
2. COORDINATES ARE MICHIGAN STATE PLANE-SOUTH ZONE. THE VERTICAL DATUM IS NGVD 29.
3. PROPERTY BOUNDARY BASED ON LEGAL DESCRIPTION PROVIDED BY U.S.EPA ON MARCH 30, 2004. COORDINATES FOR S 1/4 CORNER AND N 1/4 CORNER OF SECTION 24 AND NORTH BEARING USED TO PLOT PROPERTY LINE WERE PROVIDED BY HOLLAND ENGINEERING AND ARE BASED ON MICHIGAN STATE PLANE - SOUTH ZONE COORDINATES.
4. THE APPROXIMATE LIMITS OF VISIBLE RESIDUALS WAS DERIVED FROM THE ALLIED PAPER, INC. /PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE REMEDIAL INVESTIGATION, TECHNICAL MEMORANDUM 8, (GERAGHTY AND MILLER, INC. MAY 31, 1994), AND REVISED BASED ON THE U.S.EPA'S 2003 PRECONSTRUCTION INVESTGATION AND ON THE REMOVAL ACTIONS PREFORMED ALONG THE RIVERBANKS IN 2007 AS PART OF THE EMERGENCY ACTION.

PROJECT: **12TH STREET LANDFILL**
DRAFT REMEDIAL DESIGN WORKPLAN
OTSEGO TOWNSHIP, MICHIGAN

SHEET TITLE: **PREVIOUS LANDFILL INVESTIGATIONS**

DRAWN BY:	stormerl	SCALE:	1"=100'	PROJ. NO.	5117.02 \ RDW
CHECKED BY:	ECW			FILE NO.	PREVIOUS LI.PLT
APPROVED BY:	LEH	DATE PRINTED:		FIGURE	7
DATE:	FEBRUARY 2008				

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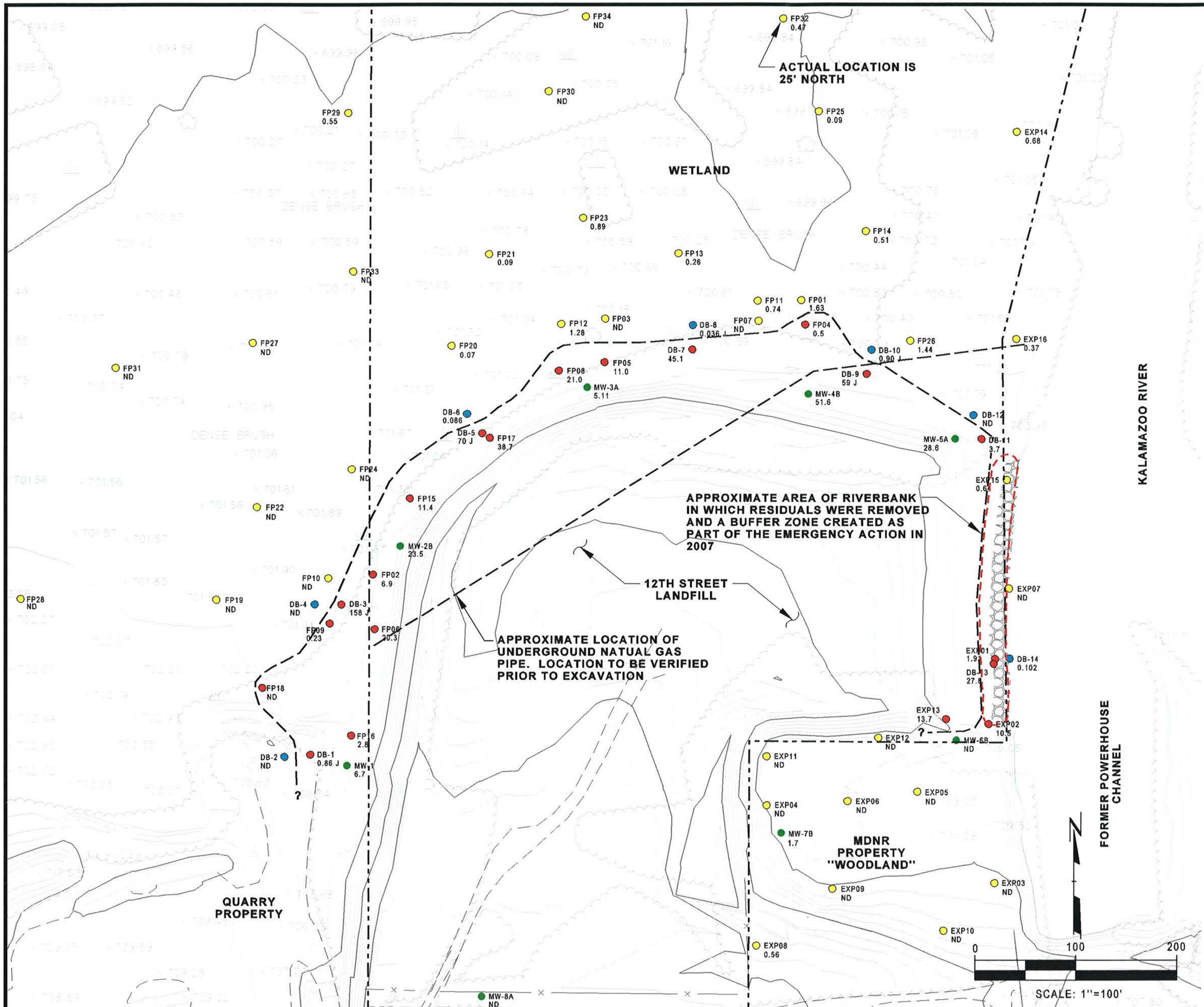
Fax: 608.831.3334



LEGEND

- ○ (yellow) BORING LOCATION AT WHICH VISIBLE PAPER RESIDUALS WERE NOT PRESENT IN UPPER 24 INCHES
- ● (red) BORING LOCATION AT WHICH VISIBLE PAPER RESIDUALS WERE DOCUMENTED IN BORING LOGS
- ● (blue) BORING LOCATION AT WHICH VISIBLE PAPER RESIDUALS WERE PRESUMED TO NOT HAVE BEEN IDENTIFIED (GIVEN THE OBJECTIVE OF THE INVESTIGATION), BUT WERE NOT DOCUMENTED (BORING LOGS ARE NOT AVAILABLE)
- ● (green) MONITORING WELL
- - - - APPROXIMATE PROPERTY BOUNDARY
- — — APPROXIMATE LIMITS OF VISIBLE PAPER RESIDUALS

NOTES

1. RESULTS FOR THE "EXP" AND "FP" SAMPLING SERIES PROVIDED BY THE U.S.EPA. THE SAMPLING WAS CONDUCTED BY THE U.S.EPA IN SEPTEMBER AND OCTOBER 2003.
2. RESULTS FOR THE "DB-" SAMPLING SERIES ARE FROM THE ALLIED PAPER, INC./PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE REMEDIAL INVESTIGATION, TECHNICAL MEMORANDUM 8 (GERAGHTY AND MILLER, INC. MAY 31, 1994).
3. THE APPROXIMATE LIMITS OF VISIBLE PAPER RESIDUALS WAS DERIVED FROM THE ALLIED PAPER, INC./PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE REMEDIAL INVESTIGATION, TECHNICAL MEMORANDUM 8 (GERAGHTY AND MILLER, INC. MAY 31, 1994), AND REVISED BASED ON THE U.S.EPA'S 2003 PREDESIGN INVESTIGATION AND ON THE REMOVAL ACTIONS PERFORMED ALONG THE RIVERBANK IN 2007 AS PART OF THE EMERGENCY ACTION.
4. THE CONCENTRATIONS SHOWN ARE THE MAXIMUM CONCENTRATION (MG/KG) OF TOTAL PCBS AT EACH LOCATION.
5. PROPERTY BOUNDARY BASED ON LEGAL DESCRIPTION PROVIDED BY THE U.S.EPA ON MARCH 30, 2004. COORDINATES FOR S1/4 CORNER AND N 1/4 CORNER OF SECTION 24 AND NORTH BEARING USED TO PLOT PROPERTY LINE WERE PROVIDED BY HOLLAND ENGINEERING AND ARE BASED ON MICHIGAN STATE PLANE, SOUTH ZONE, NAD 83, US SURVEY FOOT COORDINATES.
6. CONCENTRATIONS QUALIFIED WITH A "J" FLAG ARE ESTIMATED VALUES. THE TOTAL CONCENTRATIONS ARE UNCERTAIN.

PROJECT:	12TH STREET LANDFILL DRAFT REMEDIAL DESIGN WORKPLAN OTSEGO TOWNSHIP, MICHIGAN		
SHEET TITLE:	PREVIOUS WETLAND, WOODLAND, AND QUARRY AREA INVESTIGATIONS		
DRAWN BY: stormerl	SCALE:	PROJ. NO.	5117.02 \ RDW
CHECKED BY: ECW	1" = 100'	FILE NO.	PRE INVEST.PLT
APPROVED BY: LEH	DATE PRINTED:	FIGURE 8	
DATE: FEBRUARY 2008			

RMT

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Phone: 608.831.4444
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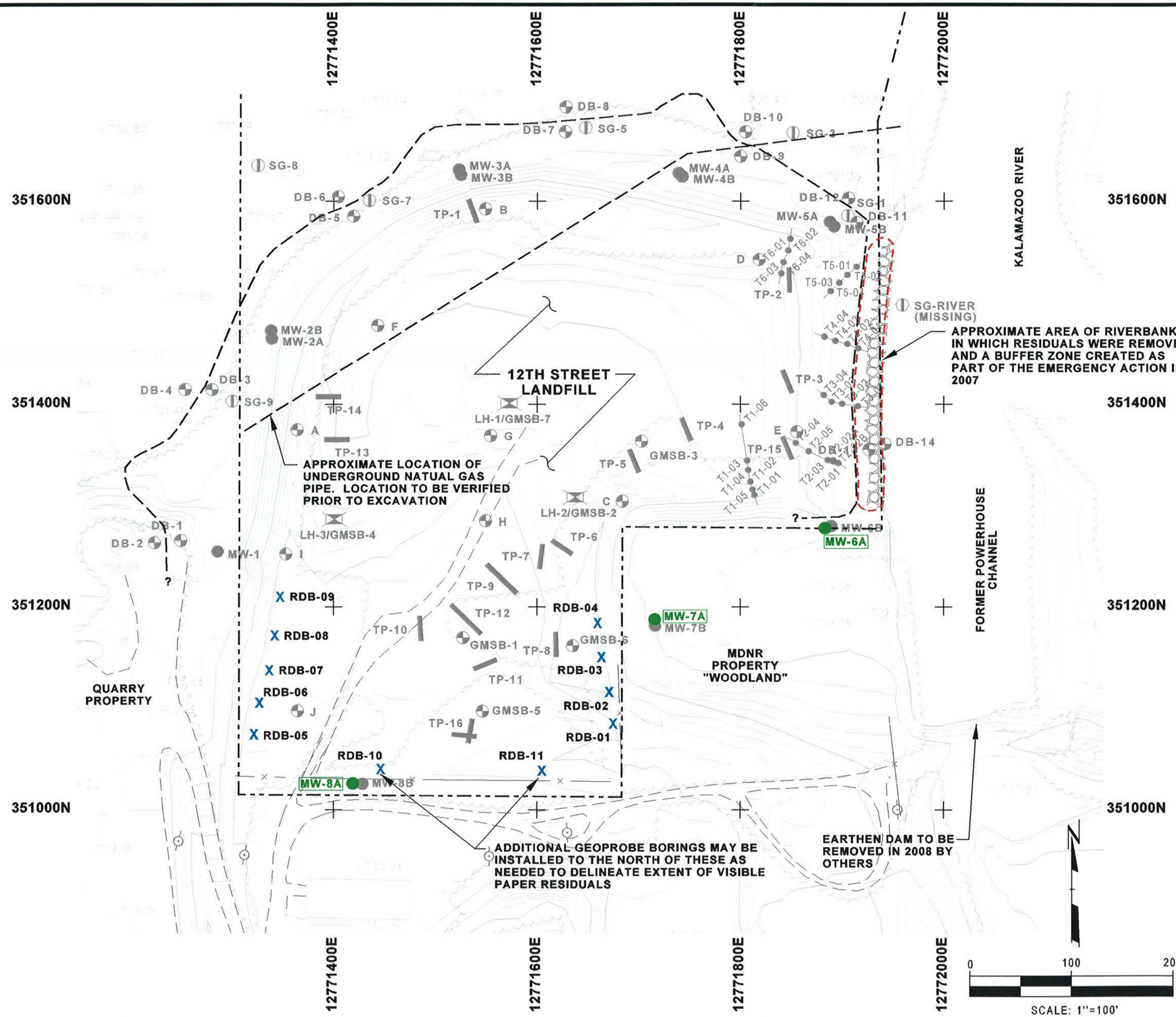

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- GRID LOCATION
- EXISTING UNPAVED ROAD
- EXISTING FENCE
- EXISTING BUILDING
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING SPOT ELEVATION
- EXISTING TREES AND/OR BRUSH
- EXISTING WETLAND LIMITS
- APPROXIMATE LIMITS OF PAPER RESIDUALS USING VISUAL CRITERIA
- EXISTING OVERHEAD ELECTRIC
- MW-10 EXISTING MONITORING WELL
- MW-6A EXISTING MONITORING WELL SCREENED IN VADOSE ZONE (POTENTIAL LANDFILL GAS MONITORING LOCATION)
- SG-3 EXISTING STAFF GAUGE
- C FORMER SOIL BORING
- LH-1/GMSB-7 EXISTING LEACHATE HEADWELL
- TP-14 FORMER TEST PIT
- T5-01 FORMER GEOPROBE BORING
- X RDB-01 PROPOSED GEOPROBE BORING

NOTES

1. BASE TOPOGRAPHY PROVIDED BY OAS, INC. OF SEYMOUR, INDIANA BASED ON AERIAL SURVEY DATED 3/30/2005. UPDATED TOPOGRAPHY FOR THE 12TH STREET LANDFILL WAS PROVIDED BY HOLLAND ENGINEERING, INC. SURVEY DATE: DECEMBER 6, 2007.
2. COORDINATES ARE MICHIGAN STATE PLANE-SOUTH ZONE. THE VERTICAL DATUM IS NGVD 29.
3. PROPERTY BOUNDARY BASED ON LEGAL DESCRIPTION PROVIDED BY U.S.EPA ON MARCH 30, 2004. COORDINATES FOR S 1/4 CORNER AND N 1/4 CORNER OF SECTION 24 AND NORTH BEARING USED TO PLOT PROPERTY LINE WERE PROVIDED BY HOLLAND ENGINEERING AND ARE BASED ON MICHIGAN STATE PLANE - SOUTH ZONE COORDINATES.
4. THE APPROXIMATE LIMITS OF VISIBLE RESIDUALS USING VISUAL CRITERIA WAS DERIVED FROM THE ALLIED PAPER, INC. /PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE REMEDIAL INVESTIGATION, TECHNICAL MEMORANDUM 8, (GERAGHTY AND MILLER, INC. MAY 31, 1994), AND REVISED BASED ON THE U.S. EPA'S 2003 PRECONSTRUCTION INVESTIGATION AND ON THE REMOVAL ACTIONS PERFORMED ALONG THE RIVERBANK IN 2007 AS PART OF THE EMERGENCY ACTION.

PROJECT: **12TH STREET LANDFILL DRAFT REMEDIAL DESIGN WORKPLAN OTSEGO TOWNSHIP, MICHIGAN**

SHEET TITLE: **PROPOSED LANDFILL PREDESIGN INVESTIGATIONS**

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CHECKED BY:	ECW		FILE NO.	PROPOSED LI.PLT
APPROVED BY:	LEH	DATE PRINTED:	FIGURE	9
DATE:	FEBRUARY 2008			

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Phone: 608.831.4444
Fax: 608.831.3334

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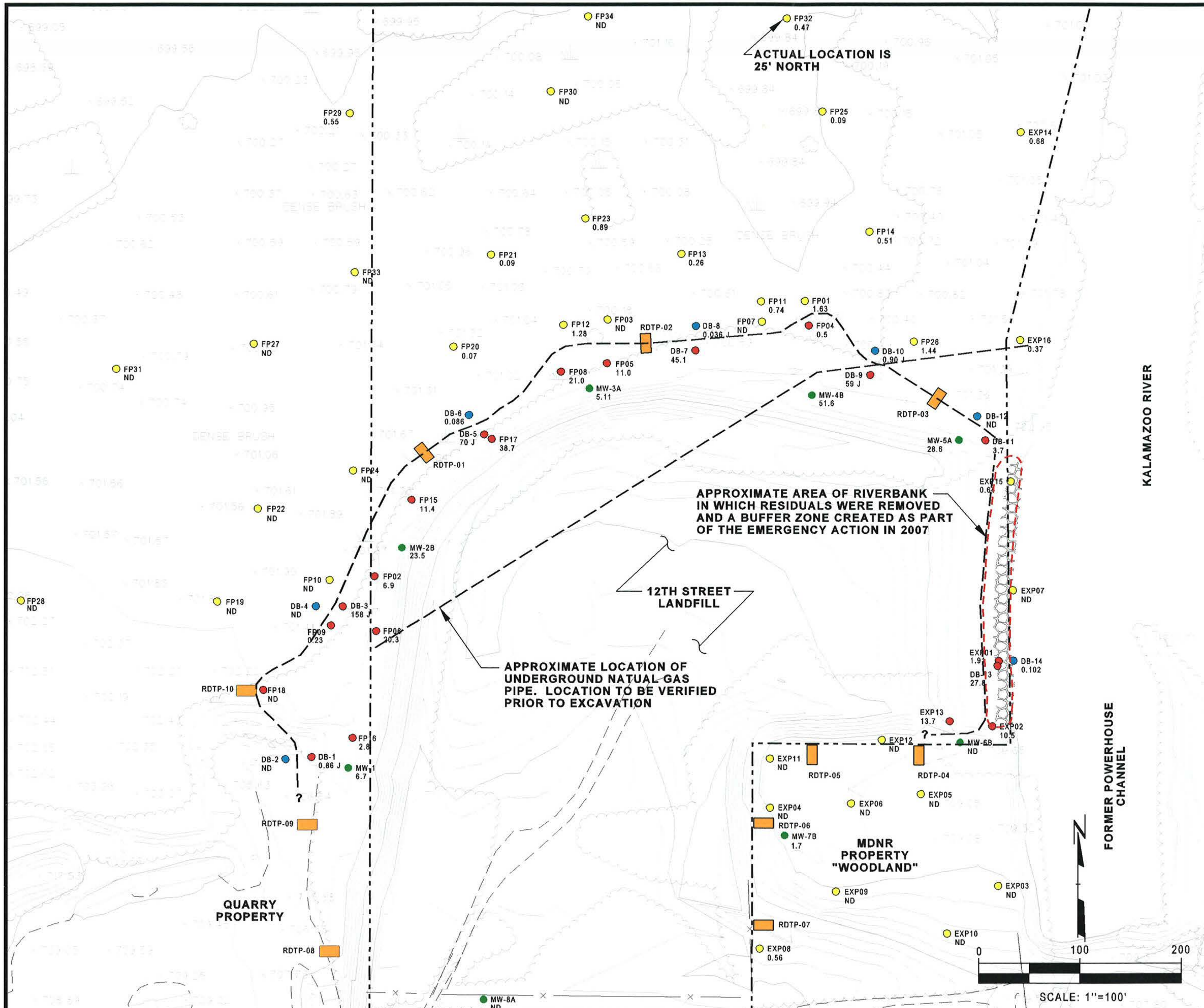

LEGEND

- RDTP-01 PROPOSED TEST PIT
- BORING LOCATION AT WHICH VISIBLE PAPER RESIDUALS WERE NOT PRESENT IN UPPER 24 INCHES
- BORING LOCATION AT WHICH VISIBLE PAPER RESIDUALS WERE DOCUMENTED IN BORING LOGS
- BORING LOCATION AT WHICH VISIBLE PAPER RESIDUALS WERE PRESUMED TO NOT HAVE BEEN IDENTIFIED (GIVEN THE OBJECTIVE OF THE INVESTIGATION), BUT WERE NOT DOCUMENTED (BORING LOGS ARE NOT AVAILABLE)
- MONITORING WELL
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE LIMITS OF PAPER RESIDUALS USING VISUAL CRITERIA

NOTES

1. RESULTS FOR THE "EXP" AND "FP" SAMPLING SERIES PROVIDED BY THE USEPA. THE SAMPLING WAS CONDUCTED BY THE USEPA IN SEPTEMBER AND OCTOBER 2003.
2. RESULTS FOR THE "DB-" SAMPLING SERIES ARE FROM THE ALLIED PAPER, INC./PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE REMEDIAL INVESTIGATION, TECHNICAL MEMORANDUM 8, GERAGHTY AND MILLER, INC. MAY 31, 1994.
3. THE APPROXIMATE LIMITS OF VISIBLE RESIDUALS CRITERIA WAS DERIVED FROM THE ALLIED PAPER, INC./PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE REMEDIAL INVESTIGATION, TECHNICAL MEMORANDUM 8, (GERAGHTY AND MILLER, INC. MAY 31, 1994,) AND REVISED BASED ON THE U.S.EPA'S 2003 PRECONSTRUCTION INVESTIGATION AND ON THE REMOVAL ACTIONS PERFORMED ALONG THE RIVERBANK IN 2007 AS PART OF THE EMERGENCY ACTION.
4. THE CONCENTRATIONS SHOW THE MAXIMUM CONCENTRATION (MG/KG) OF TOTAL PCBS IN EACH DEPTH INTERVAL AT EACH SAMPLE LOCATION.
5. PROPERTY BOUNDARY BASED ON LEGAL DESCRIPTION PROVIDED BY THE USEPA IN A FAX DATED MARCH 30, 2004. COORDINATES FOR S1/4 CORNER AND N 1/4 CORNER OF SECTION 24 AND NORTH BEARING USED TO PLOT PROPERTY LINE WERE PROVIDED BY HOLLAND ENGINEERING AND ARE BASED ON MICHIGAN STATE PLANE, SOUTH ZONE, NAD 83, US SURVEY FOOT COORDINATES.
6. CONCENTRATIONS QUALIFIED WITH A "J" FLAG ARE ESTIMATED. THE TOTAL CONCENTRATIONS ARE UNCERTAIN.

PROJECT:	12TH STREET LANDFILL DRAFT REMEDIAL DESIGN WORKPLAN OTSEGO TOWNSHIP, MICHIGAN		
SHEET TITLE:	PROPOSED WETLAND, WOODLAND, AND QUARRY AREA PREDESIGN INVESTIGATIONS		
DRAWN BY: stormerl	SCALE: 1"=100'	PROJ. NO. 5117.02 \ RDW	
CHECKED BY: ECW		FILE NO. PRO INVEST.PLT	
APPROVED BY: LEH	DATE PRINTED:	FIGURE 10	
DATE: FEBRUARY 2008			

RMT

744 Heartland Trail
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Phone: 608.831.4444
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Ref. File 3 = J:\05117\02\RDW\proposed.dgn (3) pro
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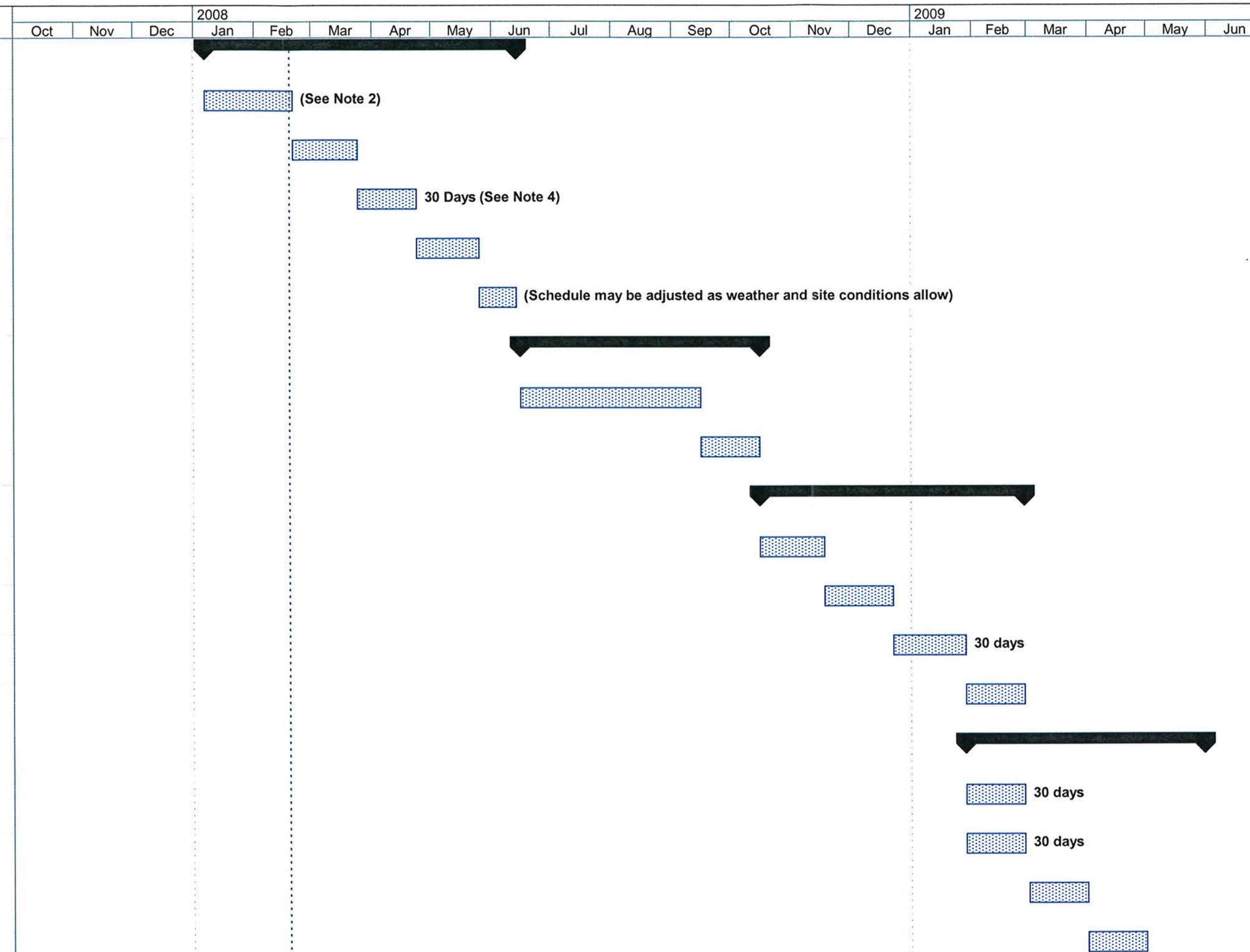
Proposed RD/RA Schedule for the 12th Street Landfill
Otsego Township, Michigan
(Operable Unit #4, Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site)

ID	Task Name	Start	Finish	Predecessors
1	**RD Work Plan/Pre-Design Studies**	**Mon 1/7/08**	**Fri 6/13/08**	
2	Develop RD Work Plan and Submit to U.S. EPA (See Note 1)	Mon 1/7/08	Wed 2/20/08	
3	U.S. EPA Review of RD Work Plan	Thu 2/21/08	Mon 3/24/08	
4	Address U.S. EPA's Comments and Submit Revised RD Work Plan to U.S. EPA	Tue 3/25/08	Wed 4/23/08	
5	U.S. EPA Approval of Revised RD Work Plan	Thu 4/24/08	Sun 5/25/08	
6	Conduct Pre-Design Field Activities	Mon 5/26/08	Fri 6/13/08	
7	**Preliminary Design**	**Mon 6/16/08**	**Wed 10/15/08**	
8	Develop Preliminary Design Report and Submit to U.S. EPA (See Note 4)	Mon 6/16/08	Mon 9/15/08	
9	U.S. EPA Review of Preliminary Design Report	Tue 9/16/08	Wed 10/15/08	
10	**Final Design**	**Thu 10/16/08**	**Fri 2/27/09**	
11	Develop Final Design Report and Submit to U.S. EPA	Thu 10/16/08	Mon 11/17/08	
12	U.S. EPA Review of Final Design Report	Tue 11/18/08	Mon 12/22/08	
13	Address U.S. EPA's Comments and Submit Revised Final Design Report	Tue 12/23/08	Wed 1/28/09	
14	U.S. EPA Approval of Final Design Report	Thu 1/29/09	Fri 2/27/09	
15	**Remedial Action Work Plan**	**Thu 1/29/09**	**Sat 5/30/09**	
16	Develop RA Work Plan and Submit to U.S. EPA	Thu 1/29/09	Fri 2/27/09	
17	Prepare Amendment to Health and Safety Plan for RA Field Activities	Thu 1/29/09	Fri 2/27/09	
18	U.S. EPA Review of RA Work Plan	Mon 3/2/09	Tue 3/31/09	
19	Address U.S. EPA's Comments and Submit Revised RA Work Plan to U.S. EPA	Wed 4/1/09	Thu 4/30/09	
20	U.S. EPA Approval of RA Work Plan	Fri 5/1/09	Sat 5/30/09	



Notes:
(1) Includes Health and Safety Plan for Pre-Design Studies
(2) The Consent Decree allows 60 days for this deliverable. Weyerhaeuser has decided to expedite submittal.
(3) Duration is specified in the Consent Decree
(4) Includes the results for the Pre-Design Studies and all components of Final Design Deliverable

FIGURE 11

I/WPMSN/PJT/00-05117/02/000511702-001.mpp

Appendix A
Multi-Area Quality Assurance Project Plan - Revision 2

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Multi-Area Quality Assurance Project Plan

Allied Paper, Inc./Portage Creek/
Kalamazoo River Superfund Site

Revision 02
February 2008

Prepared by
RMT, Inc.
on behalf of Weyerhaeuser Company

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List of Attachments

(Note: Attachments are not included in this revision (i.e., Revision 02). No changes have been made to the attachments that were included in the Multi-Area QAPP, Revision 00, dated June 2007, and Revision 01, dated September 2007.)

Attachment 1-1	Laboratory Accuracy and Precision Objectives
Attachment 1-2	PCB Surrogate Compound Recovery Limits
Attachment 1-3	Sample Chain-of-Custody Record
Attachment 1-4	Laboratory Quality Assurance Manual
Attachment 1-5	Laboratory SOPs
Attachment 1-6	Laboratory Policies and Guidelines

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QAPP Worksheet #1	February 2008	Title and Approval Page
QAPP Worksheet #2	February 2008	Identifying Information
QAPP Worksheet #3	February 2008	Distribution List
QAPP Worksheet #4-1	February 2008	Project Personnel Sign-Off Sheet (RMT)
QAPP Worksheet #4-2	September 2007	Project Personnel Sign-Off Sheet (WATS)
QAPP Worksheet #5-1	September 2007	Project Organizational Chart (Emergency Response Activities for the 12th Street Landfill and the Plainwell Mill Banks)
QAPP Worksheet #5-2	February 2008	Project Organization Chart (Predesign Investigations for the Remedial Design for the 12Th Street Landfill)
QAPP Worksheet #6-1	September 2007	Communication Pathways (Emergency Response Activities for the 12th Street Landfill and the Plainwell Mill Banks)
QAPP Worksheet 6-2	February 2008	Communication Pathways (Predesign Investigations for the Remedial Design for the 12Th Street Landfill)
QAPP Worksheet #7	February 2008	Personnel Responsibilities and Qualifications
QAPP Worksheet #8	June 2007	Special Personnel Training Requirements
QAPP Worksheet #9-1	June 2007	Project Scoping Session Participants Sheet (May 8, 2007)
QAPP Worksheet #9-2	June 2007	Project Scoping Session Participants Sheet (June 6, 2007)
QAPP Worksheet #9-3	February 2008	Project Scoping Session Participants Sheet (December 7, 2007)
QAPP Worksheet #9-4	February 2008	Project Scoping Session Participants Sheet (January 9, 2008)
QAPP Worksheet #10-1	June 2007	Problem Definition - DQOs (Emergency Response Activities in the Former Powerhouse Discharge Channel)
QAPP Worksheet #10-2	September 2007	Problem Definition - DQOs (Emergency Response on the Plainwell Mill Banks)
QAPP Worksheet #10-3	February 2008	Problem Definition - DQOs (Predesign Investigations for the Remedial Design for the 12th Street Landfill)
QAPP Worksheet #11-1	September 2007	Project Quality Objectives/Systematic Planning Process Statements (Emergency Response Activities in the Former Powerhouse Discharge Channel)

WORKSHEET	DATE OF LAST REVISION	TITLE
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QAPP Worksheet #11-3	February 2008	Project Quality Objectives/Systematic Planning Process Statements (Predesign Investigations for the Remedial Design for the 12th Street Landfill)
QAPP Worksheet #12-1	June 2007	Measurement Performance Criteria (PCBs - Surface Water)
QAPP Worksheet #12-2	June 2007	Measurement Performance Criteria (Wet Chemistry - Surface Water)
QAPP Worksheet #12-3	June 2007	Measurement Performance Criteria (PCBs - Soil/Sediment)
QAPP Worksheet #13-1	February 2008	Secondary Data Criteria and Limitations (12th Street Landfill)
QAPP Worksheet #13-2	September 2007	Secondary Data Criteria and Limitations (Plainwell Mill)
QAPP Worksheet #14	February 2008	Summary of Project Tasks
QAPP Worksheet #15-1	June 2007	Reference Limits and Evaluation (Surface Water)
QAPP Worksheet #15-2	June 2007	Reference Limits and Evaluation (Soil/Sediment)
QAPP Worksheet #16-1	June 2007	Project Schedule/Timeline (Emergency Response Activities in the Former Powerhouse Discharge Channel)
QAPP Worksheet #16-2	September 2007	Project Schedule/Timeline (Emergency Response Activities on the Plainwell Mill Banks)
QAPP Worksheet #16-3	February 2008	Project Schedule/Timeline (Predesign Investigations for the Remedial Design for the 12th Street Landfill)
QAPP Worksheet #17-1	June 2007	Sampling Design and Rationale (Former Powerhouse Discharge Channel)
QAPP Worksheet #17-2	September 2007	Sampling Design and Rationale (Emergency Response on the Plainwell Mill Banks)
QAPP Worksheet #17-3	February 2008	Sampling Design and Rationale (Predesign Investigations for the Remedial Design For the 12th Street Landfill)
QAPP Worksheet #18-1	September 2007	Sampling Locations and Methods/SOP Requirements (Emergency Response Activities)
QAPP Worksheet #18-2	February 2008	Sampling Locations and Methods/SOP Requirements (Predesign Investigations for the Remedial Design For the 12th Street Landfill)
QAPP Worksheet #19	June 2007	Analytical SOP Requirements
QAPP Worksheet #20	June 2007	Field Quality Control Sample Summary
QAPP Worksheet #21	February 2008	Project Sampling SOP Reference
QAPP Worksheet #22	February 2008	Field Equipment Calibration, Maintenance, Testing, and Inspection
QAPP Worksheet #23	June 2007	Analytical SOP References
QAPP Worksheet #24	June 2007	Analytical Instrument Calibration
QAPP Worksheet #25	June 2007	Analytical Instrument and Equipment Maintenance, Testing, and Inspection
QAPP Worksheet #26	June 2007	Sample Handling System (WATS)
QAPP Worksheet #27	June 2007	Sample Custody Requirements
QAPP Worksheet #28-1	June 2007	QC Samples - PCBs (Surface Water)
QAPP Worksheet #28-2	June 2007	QC Samples - TSS (Surface Water)
QAPP Worksheet #28-3	June 2007	QC Samples - Phosphorus (Surface Water)
QAPP Worksheet #28-4	June 2007	QC Samples - PCBs (Soil/Sediment)
QAPP Worksheet #29	June 2007	Project Documents and Records
QAPP Worksheet #30	February 2008	Analytical Services
QAPP Worksheet #31-1	February 2008	Planned Project Assessments (Emergency Response Activities)
QAPP Worksheet #31-2	February 2008	Planned Project Assessments (Predesign Investigations for the Remedial Design For the 12th Street Landfill)

WORKSHEET	DATE OF LAST REVISION	TITLE
QAPP Worksheet #32-1	February 2008	Assessment Findings and Corrective Action Responses (Emergency Response Activities)
QAPP Worksheet #32-2	February 2008	Assessment Findings and Corrective Action Responses (Predesign Investigations for the Remedial Design For the 12th Street Landfill)
QAPP Worksheet #33	February 2008	QA Management Reports
QAPP Worksheet #34	February 2008	Verification (Step I) Process
QAPP Worksheet #35	February 2008	Validation (Step I) Process
QAPP Worksheet #36	February 2008	Validation (Steps IIa and IIb) Summary
QAPP Worksheet #37	February 2008	Usability Assessment

Acronyms and Abbreviations

μg/L	micrograms per liter
μg/kg	micrograms per kilogram
AA	atomic absorption
ARAR	Applicable Relevant and Appropriate Requirements
ASTM	American Society for Testing and Materials
BFB	p-bromofluorobenzene
BNA	base-neutral-acid extractables
CCB	continuing calibration blank
CCC	calibration check compound
CCV	continuing calibration verification
CD	Consent Decree
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COC	Chain-of-Custody
COPC	constituent of potential concern
CVAA	cold vapor atomic absorption
DFTPP	decafluorotriphenylphosphine
DI	deionized
DO	dissolved oxygen
DQI	data quality indicators
DQO	Data Quality Objective
ECD	electron capture detector
EDD	electronic data deliverable
Eh	redox
FB	field blank
FS	Feasibility Study
FSP	Field Sampling Plan
GC/MS	gas chromatograph/mass spectrophotometer
HSP	Health and Safety Plan
ICB	initial calibration blank

ICP	inductively coupled plasma
ICPMS	inductively coupled plasma mass spectroscopy
ICS	interface check samples
ICV	initial calibration verification
IDW	investigation-derived waste
kg	kilogram
KRSG	Kalamazoo River Study Group
L	liter
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LRA	linear range analysis
MDEQ	Michigan Department of Environmental Quality
MDL	Method Detection Limit
MS	matrix spike
MS/MSD	matrix spike/matrix spike duplicate
MSD	matrix spike duplicate
NCP	National Contingency Plan
NIST	National Institute of Standards and Technology
NTU	nephelometric turbidity unit
OSC	On-Site Coordinator
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
pH	negative logarithm (base 10) of hydrogen ion activity
PID	photoionization detector
PQO	Project Quality Objective
POTW	publicly-owned treatment works
PM	Project Manager
QA	quality assurance
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
QC	quality control
QL	Quantitation Limit
RASs	routine analytical services
RD/RA	Remedial Design/Remedial Action

RF	response factor
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPD	relative percent difference
RL	reporting limit
RPM	Remedial Project Manager
RSD	relative standard deviation
RT	retention time
SAP	Sampling and Analysis Plan
SAS	special analytical services
SOP	standard operating procedure
SOW	Statement of Work
SPCC	system performance check compound
SRI/FS	Supplemental Remedial Investigation/Feasibility Study
SRM	standard reference material
SW846	Test Methods for Evaluating Solid Waste, 1996
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TCRA	Time-Critical Removal Action
TEMP	temperature
TB	trip blank
TSS	Total suspended solids
U.S. EPA	United States Environmental Protection Agency
VOC	volatile organic compound
WATS	Weyerhaeuser Analytical Testing Services

Section 1 Introduction

On February 22, 2005, Weyerhaeuser Company (Weyerhaeuser) entered into a Consent Decree (CD) with the United States Environmental Protection Agency (U.S. EPA) for the Design and Implementation of Certain Response Activities at the 12th Street Landfill site (Operable Unit No. 4) and the Plainwell Mill site (Operable Unit No. 7). Both sites are part of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site (Figure 1-1), which is located in southwestern Michigan. A Statement of Work (SOW) for the Remedial Design/Remedial Action (RD/RA) at the 12th Street Landfill site was attached to the CD. A SOW for the Remedial Investigation/Feasibility Study (RI/FS) at the Plainwell Mill site was subsequently issued by the U.S. EPA, with an effective date of August 17, 2006.

In late February 2007, the U.S. EPA authorized a Time-Critical Removal Action (TCRA) to remove polychlorinated biphenyl (PCB)--contaminated sediment in the former Plainwell Impoundment (a section of Operable Unit #5 of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site). This work was authorized through an administrative settlement agreement and Order on Consent for Removal Action (V-W-07-C-8-63). As part of the TCRA, the earthen section of the Plainwell Dam will be removed and the Kalamazoo River will be rerouted through the former powerhouse discharge channel. The 12th Street Landfill abuts the river and is located directly downstream of the earthen section of the Plainwell Dam on the western side of the former powerhouse discharge channel. The Plainwell Mill also abuts the Kalamazoo River and PCB-containing materials have been documented along the riverbank at the Mill. The change in the Kalamazoo River channel will result in an increased river gradient and higher velocities upstream and along the rerouted channel (USGS, 2004 and USDA, 2004) and are expected to flush residuals in the former powerhouse discharge channel downstream and erode bank material in the area of the Mill. Thus, the scope of the TCRA activities includes actions or occurrences that threaten releases of waste material (as defined in the CD) from both the 12th Street Landfill and the Plainwell Mill properties. Since any such release may present an immediate threat to public health or welfare of the environment, Weyerhaeuser has been authorized to conduct several emergency response actions in conjunction with completing the required work under the CD.

The U.S. EPA requires that all environmental monitoring and measurement efforts mandated or supported by the U.S. EPA participate in a centrally managed quality assurance program. Any party generating data under this program has the responsibility to implement minimum procedures to ensure that the precision, accuracy, completeness, and representativeness of the data are known and documented. To ensure that this responsibility is met uniformly, a written Quality Assurance Project Plan (QAPP) must be prepared for each project.

This Multi-Area QAPP presents the objectives, organization, functional activities, and specific quality assurance (QA) and quality control (QC) activities associated with implementing the projects that are described in Section 2. This QAPP also describes the specific protocols that will be followed for sampling, sample handling and storage, chain-of-custody, and laboratory analysis. This Multi-Area QAPP will be modified in the future as other sampling programs are identified or defined (*e.g.*, additional worksheets, such as Problem Definition-DQOs [Worksheet No. 10], will be inserted to describe the project sampling objectives and sampling program).

1.1 Development of the Multi-Area QAPP

This QAPP has been prepared in accordance with the Uniform Federal Policy for Quality Assurance Project Plans (UFP-QAPP), Manual V1, March 2005 (U.S. EPA, 2005a), and the Uniform Federal Policy for Quality Assurance Project Plans, Part 2B, Quality Assurance/Quality Control Compendium: Minimum QA/QC Activities V1, March 2005 (U.S. EPA, 2005b).

All QA/QC procedures performed under this QAPP will be in accordance with applicable professional technical standards, U.S. EPA requirements, other pertinent government regulations and guidelines, and the specific project goals and requirements.

1.2 Project Setting

The Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site is located in southwestern Michigan. The site includes five disposal areas, five paper mill properties, an approximately 80-mile stretch of the Kalamazoo River from Morrow Dam to Lake Michigan, and a 3-mile stretch of Portage Creek. The primary site contaminant is polychlorinated biphenyls (PCBs), a hazardous substance and probable human carcinogen. PCBs were introduced to Portage Creek and the Kalamazoo River through past discharges and disposal of PCB-contaminated residuals.

The 12th Street Landfill and Plainwell Mill sites are located in Allegan County, Michigan (Figure 1-2). The 12th Street Landfill is located in Otsego Township (Section 24, Township 1N, Range 11W), and the Plainwell Mill is located in the City of Plainwell (Section 30, Township 1N, Range 11W). Both sites are located adjacent to the Kalamazoo River, with the 12th Street Landfill located approximately 1½ miles northwest and downstream of the Plainwell Mill site. The 12th Street Landfill site encompasses approximately 6.5 acres and is situated on roughly a 24-acre property that is bordered to the east by woodlands and a former hydroelectric powerhouse discharge channel on the Kalamazoo River, to the north and west by wetlands, to the south and southwest by a gravel mining operation, and to the south and southeast by industrially developed lands and the Plainwell Dam (which is scheduled to be removed as part of the U.S. EPA-approved TCRA in 2007-2008). The Plainwell Mill site encompasses approximately 36 acres and is bordered by the Kalamazoo River to the north, the Plainwell central business district to the east, residential properties to the south, and commercial properties and the City of Plainwell wastewater treatment plant to the west.

Plainwell, Inc., is the current owner of the 12th Street Landfill property, although Plainwell, Inc., is a bankrupt entity with no ongoing business operations. Weyerhaeuser is currently in negotiations with Plainwell, Inc., to take ownership of the 12th Street Landfill property. The mill property has been vacant since the former Simpson Plainwell Paper Company filed for bankruptcy in 2000. The City of Plainwell is the current owner of the Plainwell Mill property, having purchased the property out of the Plainwell Mill bankruptcy in 2006. Weyerhaeuser owned and operated the mill and the landfill for approximately a 9-year period, between 1961 and 1970. During that time, dewatered sludge from wastewater treatment operations was excavated from lagoons on the mill property and transported for disposal at the 12th Street Landfill site.

1.3 Applicability of the Multi-Area QAPP

This Multi-Area QAPP is applicable for work to be performed by Weyerhaeuser and its representatives within the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site. The work activities will include tasks conducted by Weyerhaeuser under its 2005 CD with the U.S. EPA, as may be amended or modified, at the following sites:

- 12th Street Landfill (Operable Unit No. 4)
- Plainwell Mill (Operable Unit No. 7)

Additional areas may be addressed in the future through modifications of this Multi-Area QAPP. This QAPP may be updated to address additional emergency activities and/or to integrate applicable workplan activities as required under the CD.

In September 2007, this QAPP was amended to include the removal of residuals and sediment along certain sections of the banks along the Plainwell Mill property. As defined in the 2005 CD, the limits of the Plainwell Mill Operable Unit (OU-7) extend to the top of the riverbank. Consequently, the banks of the mill property are part of the Kalamazoo River Operable Unit (OU-5).

LEGEND

PROPERTY BOUNDARIES

N

0 1,000 2,000 4,000 FEET

1 INCH EQUALS 2,000 FEET

1:24,000

PROJECT LOCATION

BASE MAP FROM USGS 7.5 MINUTE QUADRANGLE, OSTEGO, 1967, REVISED 1973.

RMT® 744 Heartland Trail, Madison, WI 53717 - 1934; P.O. Box 8923, Madison, WI 53708 - 8923, Phone: 608-831-4444, Fax: 608-831-3021	SITE LOCATION MAP	DRAWN BY:	PAPEZ J
		APPROVED BY:	LEH
	WEYERHAEUSER COMPANY MULTI-AREA QAPP PLAINWELL, MICHIGAN	PROJ. NO.:	00-005117.05
		FILE NO.:	51170501.mxd
		DATE:	JUNE 2007

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FIGURE 1-1

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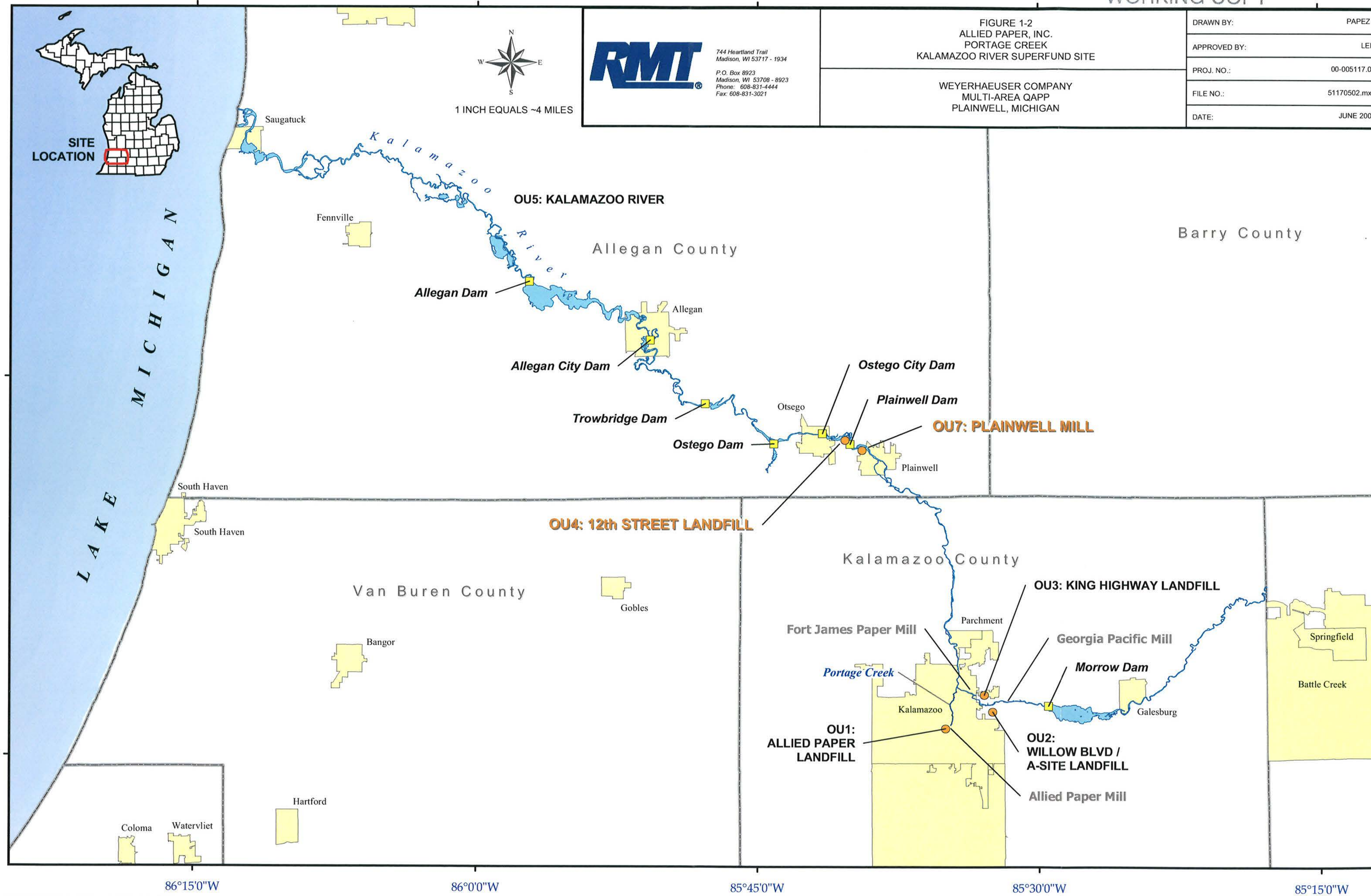

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Section 2
Scope of Activities

The subsections below provide a summary of the scope for each project conducted under this Multi-Area QAPP to date, as well as new projects being added in this revision. These projects include the following:

1. Emergency response activities in the former powerhouse discharge channel at the 12th Street Landfill (as initially described in Revision 00, June 2007)
2. Emergency Response activities on portions of the riverbank along the Plainwell Mill (as initially described in Addendum 01, September 2007)
3. Predesign investigations for the remedial design for the 12th Street Landfill (added in this version of the Multi-Area QAPP [i.e., Revision 02, February 2008])

The summaries of projects included in previous revisions of this document have not been revised or deleted. As new projects are initiated, new information will be added to this Multi-Area QAPP to cover the new projects and additional revisions will made, as needed. A new revision number will also be assigned to the document (e.g., Revision 02 will be revised to Revision 03, and so on).

2.1 Emergency Response Activities at the 12th Street Landfill (Operable Unit No. 4)

Weyerhaeuser has not yet received a formal notification from the U.S. EPA to proceed with the 12th Street Landfill Remedial Design/Remedial Action (RD/RA) work specified in the CD. The full scope of the Remedial Action (RA) for the 12th Street Landfill generally includes the excavation of wastewater residuals present outside the footprint of the landfill (on adjacent properties and in the former powerhouse discharge channel); the relocation of the excavated material back into the landfill, the construction of a landfill cover and erosion protection measures, and various environmental monitoring activities. Among the paper residuals to be excavated are those present in the former powerhouse discharge channel (a backwater of the Kalamazoo River), to the extent that these residuals are visibly contiguous with the landfill.

The TCRA in the Former Plainwell Impoundment includes the removal of the earthen section of the Plainwell Dam. The TCRA was approved by the U.S. EPA in February 2007, and the specified work will be implemented by the Kalamazoo River Study Group (KRSG) in 2007 and 2008 (Arcadis BBL, 2007a). Consequently, Weyerhaeuser needs to conduct certain activities at the 12th Street Landfill site under Section XVII, paragraph 67 (Emergency Response), of Weyerhaeuser's CD with the U.S. EPA in order to accommodate the TCRA and to prevent erosion of the banks of the landfill. These activities include removing visible residuals in the former powerhouse discharge channel, cutting back the existing landfill slope along the river, and installing erosion protection on the eastern bank of the 12th Street Landfill consistent with the requirements of the Record of Decision (ROD).

2.1.1 Former Powerhouse Discharge Channel

The 12th Street Landfill is situated directly downstream of the Plainwell Dam, on the same side of the river as the earthen section of the dam that will be removed as part of the TCRA. After the earthen section of the Plainwell Dam is removed, the former powerhouse discharge channel (currently a backwater) will become the main channel of the Kalamazoo River. This will create a larger gradient on the river with resultant higher flow velocities and greater shear stresses (*i.e.*, erosion potential) in the former powerhouse discharge channel and on various bank areas upstream of the current Plainwell Dam. The change will also alter flood conditions near the landfill. Without action, the channel rerouting will resuspend and redistribute paper residuals that are present in the discharge channel, including residuals that may be contiguous with the 12th Street Landfill. The modified flow is also modeled to increase shear stresses along the riverbank adjacent to the 12th Street Landfill, resulting in possible destabilization of the banks and increased erosion. To prevent this from occurring, Weyerhaeuser plans to perform the following activities:

- Conduct bathymetric and visual sediment assessments to determine the visual characteristics of the sediment and the depth of water in the former powerhouse discharge channel (RMT, 2007a). Use this information, in conjunction with previously available information (G&M, 1994; U.S. EPA, 2004), to estimate the extent of visual wastewater residuals that are contiguous with the 12th Street Landfill, present in the channel sediment, and subject to mobilization once the Kalamazoo River is rerouted.
- Excavate visible wastewater residuals that are contiguous with the 12th Street Landfill and present in the channel sediment. Dewater the sediment, and treat and sample water from the dewatering process before discharge back to the Kalamazoo River. Dispose the excavated sediment in the 12th Street Landfill.
- Collect post-excavation confirmation samples in the former powerhouse discharge channel to confirm that wastewater residuals that are visibly contiguous with the landfill have been removed, and that PCB concentrations in the excavated area are below 4 mg/kg.

The locations and concentration ranges of data collected previously at the site, as well as an indication of whether residuals were observed, are illustrated on Figure 2-1.

2.1.2 Eastern Bank of the Landfill

As stated in Subsection 2.1.1, after the earthen section of the Plainwell Dam is removed, the former powerhouse discharge channel will become the main channel of the Kalamazoo River. This will create higher velocities and greater shear stresses (*i.e.,* erosion potential), as well as altered flood conditions along the eastern bank of the 12th Street Landfill. Without action, the channel rerouting could erode mixed fill/paper residuals at the toe of the eastern landfill bank and may lead to instability of the bank. Moreover, certain components of the ROD, such as cutting back the sideslope of the landfill along the river and creating space for an access road along the river, are more effectively and efficiently implemented in conjunction with the work in the former discharge channel. Consequently, Weyerhaeuser plans to perform the following activities that are required by the ROD for the 12th Street Landfill as part of an Emergency Response Action:

- Cut back the existing slope of the 12th Street Landfill along the river to create a more stable angle and to provide a buffer zone to ensure that, once the final cover system is installed, there is no direct contact between the paper residuals in the landfill and the Kalamazoo River/former powerhouse discharge channel, and to provide space for an access road along the riverfront. The excavated mixed fill/paper residuals from the eastern bank will be disposed in a designated area on top of the 12th Street Landfill.
- Install erosion protection on the newly graded eastern bank of the landfill to provide protection from a 500-year flood event.

Geotechnical borings have been installed in preparation for this work (RMT, 2007b). Consistent with the requirements of the ROD, no environmental samples are planned in connection with the above work at the 12th Street Landfill.

The final cover over the landfill, along with the other components of the landfill remedy, will be designed and installed in a manner and time frame consistent with the CD.

2.2 Emergency Response Activities at the Former Plainwell Mill Banks (Operable Unit No. 5)

Weyerhaeuser Company (Weyerhaeuser) has been authorized by the United States Environmental Protection Agency (U.S. EPA) to conduct Emergency Actions at two separate locations adjacent to the Kalamazoo River under Paragraph 67 of their 2005 Consent Decree. As part of the Emergency Action for the former powerhouse channel at the 12th Street Landfill (Operable Unit 04), Multi-Area Quality Assurance Project Plan (QAPP) and Field Sampling Plan (FSP) were submitted and approved (approval letter from Michael Berkoff, dated July 24, 2007). On June 29, 2007, the U.S. EPA also authorized Weyerhaeuser to take actions to prevent, abate, or minimize a release or potential release of hazardous substances from the former Plainwell Mill banks. The former Plainwell Mill banks are considered part of the Kalamazoo River operable unit (Operable Unit 05).

The following objectives have been developed for the Emergency Action along the former Plainwell Mill banks:

- Remove or contain visible paper residuals and address previously identified areas of reported polychlorinated biphenyls (PCBs) concentrations of greater than 50 mg/kg in soils/sediments along the former Plainwell Mill banks to a target concentration of 4 mg/kg.
- Reconstruct bank, as needed, to minimize future release of PCBs.

- Reconfigure bank to limit upland cutbacks into former Plainwell Mill property and place erosion controls to provide comparable stability to pre-excavation conditions.

To achieve the excavation objectives stated above, physical and analytical data from previous investigations performed on sediments, bank soils, and floodplain soils were reviewed to identify and delineate specific areas of sediment and soil to be targeted as part of this Emergency Action. The design approach to the Emergency Action is presented in a draft final Plainwell Mill Banks Emergency Action Design Report (RMT, 2007c). Site preparation work is scheduled to begin late September 2007 with construction to follow in early October. The 2,600 linear feet of bank length has been divided into four zones based upon physical conditions and estimated quantity of visual residuals targeted for excavation. These construction zones will facilitate construction by providing an opportunity to refine the construction approach and schedule between each zone.

2.3 Predesign Investigations for the Remedial Design for the 12th Street Landfill (Operable Unit No. 4)

The 12th Street Landfill, composed primarily of the 6.5-acre closed landfill and the four areas outside the landfill where PCB-contaminated residual material has been observed, is Operable Unit #4 (OU-4) of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Kalamazoo River Superfund Site). The landfill is situated with 17 acres of wetlands on an approximately 24-acre parcel. Additional portions of OU-4 that are located outside the landfill property include the woodland area owned by the State of Michigan (State) under the management of the Michigan Department of Natural Resources (MDNR), the gravel operation adjacent to the landfill, and the former powerhouse discharge channel. Contamination in the former powerhouse discharge channel was addressed as part of Emergency Actions implemented in 2007.

Paper residuals from the former Plainwell Mill (mill), located in Plainwell, Michigan, were disposed in the 12th Street Landfill during the period from approximately 1955 to 1983. The landfill reportedly also accepted solid waste from the mill during part of its period of active operation. A number of investigations have been performed at the site. The investigations have confirmed the nature of the material in the landfill and have shown that paper residuals are present in certain areas outside of the landfill (i.e., in the wetlands to the north/northwest, the quarry property, and the State property). Some of the residuals/native soil beyond the toe of the landfill (i.e., outside the footprint of the landfill) may contain PCBs at concentrations exceeding State of Michigan or Kalamazoo River Superfund Site-specific ecological risk-based criteria.

A Record of Decision (ROD) for OU-4 was issued on September 28, 2001. In general, the components of the selected remedy include (1) the excavation and relocation of residuals potentially containing PCBs in the wetland, woodland, quarry property, and former powerhouse discharge channel into the landfill; (2) the excavation and relocation of the eastern slope of the landfill along the river sufficient to create a buffer zone that will prevent hydraulic connection between the fill material and the river; (3) the installation of an engineered cover pursuant to state requirements for a solid waste landfill (Part 115); (4) the installation of a sidewall containment system; (5) the evaluation of the need for a gas venting system within the final cover system; (6) the evaluation of the need for a leachate collection system; (7) short-term and long-term monitoring; (8) fencing, warning signs, deed restrictions, and noise and dust control; and (9) long-term maintenance and post-closure care.

In January 2005, Weyerhaeuser Company (Weyerhaeuser) negotiated a Consent Decree (CD) with the U.S. EPA (Civil Action No. 1:05-CV0003) for the design and implementation of certain response actions at Operable Unit #4 and the Plainwell, Inc., Mill. These actions include the Remedial Design (RD) and Remedial Action (RA) activities for the 12th Street Landfill. This revision of the Multi-Area Quality Assurance Project Plan (QAPP) has been prepared in fulfillment of the requirements for an RD Workplan for the 12th Street Landfill that are contained in the CD and the Statement of Work (SOW).

The RD Workplan for the 12th Street Landfill includes a number of predesign investigations, some of which will involve field data collection and visual observations. Field data collection activities will include visual information obtained by the advancement of test pits, visual information obtained by the advancement of Geoprobe® borings, and gas concentration measurements (methane, carbon dioxide, and oxygen) in existing monitoring wells and in the Geoprobe® borings advanced as part of the predesign investigation.

The field investigations will involve (1) a determination of the extent of visible paper residuals beyond the landfill footprint, (2) the collection of data to support the grading design for the final landfill cover, and (3) the collection of data for use in the design of a landfill gas venting system. Sufficient information is available from previous investigations to evaluate the potential need for a leachate collection system. No additional field information is needed to support this objective.

2.3.1 Extent of Paper Residuals Beyond Landfill Footprint

The objectives of this investigation include the following:

Wetland

- To confirm the approximate areal extent of visible paper residuals beyond the toe of the landfill as delineated based on the results from previous investigations.
- To assess the degree of difficulty in distinguishing the visible paper residuals from the native soil.
- To evaluate potential constructibility issues associated with working in the wetland north of the landfill.

Quarry/State Properties

- To delineate the areal extent, and to better estimate the depth, of visible paper residuals on the quarry property to the southwest and on the State property to the southeast, in order to support discussions with owners of these adjacent properties concerning access for conducting the remedial actions on the properties required by the ROD.

The general scope of the predesign investigation includes the following activities:

Wetland

- Excavate approximately three test pits at the locations depicted on Figure 2-2. The test pits are anticipated to be approximately 10 to 15 feet long (perpendicular to the edge of the landfill) and approximately 2 to 4 feet wide. The test pits will be excavated to a maximum depth of 3 feet if no paper residuals are visually apparent, or to the bottom of visually-identifiable residuals. In the event that in-field conditions limit the use of test pit excavating equipment (e.g., a backhoe), other tools, such as hand augers or shovels, may be used instead.

Quarry/State Properties

- Excavate approximately three test pits on the quarry property, and approximately four test pits on the State property at the locations depicted on Figure 2-2. The test pits are anticipated to be approximately 10 to 15 feet long (perpendicular to the edge of the landfill) and approximately 2 to 4 feet wide. The test pits will be excavated to a maximum depth of 3 feet if no paper residuals are visually apparent, or to the bottom of visually-identifiable residuals. In the event that in-field conditions limit the use of test pit excavating equipment (e.g., a backhoe), other tools, such as hand augers or shovels, may be used instead.

2.3.2 Grading Design

The objective of this investigation is the following:

- To better estimate the depth of the paper residuals along the property boundaries with 12th Street, the quarry to the southwest, and with the State property to the southeast, in order to reduce uncertainties in designing the final landfill grades.

The general scope of this investigation is the following:

- Advance approximately nine Geoprobe® borings into the 12th Street Landfill at locations where fill material is believed to extend beyond the property boundaries to the southwest and to the southeast (see locations on Figure 2-3). The borings will be advanced approximately 5 feet into the native soil underlying the fill, or to refusal.
- Advance a minimum of two soil borings (RDB-10 and RDB-11) near the southern end of the landfill, as shown on Figure 2-3, to confirm the thickness of the fill in this area. Advance the borings approximately 5 feet into the native soil underlying the fill or to refusal. The locations of these borings may be adjusted in the field as necessary to avoid underground or

aboveground utility lines. Additional borings may be installed to the north of the initial borings as may be deemed useful by Weyerhaeuser, in consultation with oversight agencies as needed, for purposes of designing the landfill cover (*e.g.,* if fill material is not encountered at a location where existing data indicate that fill is present).

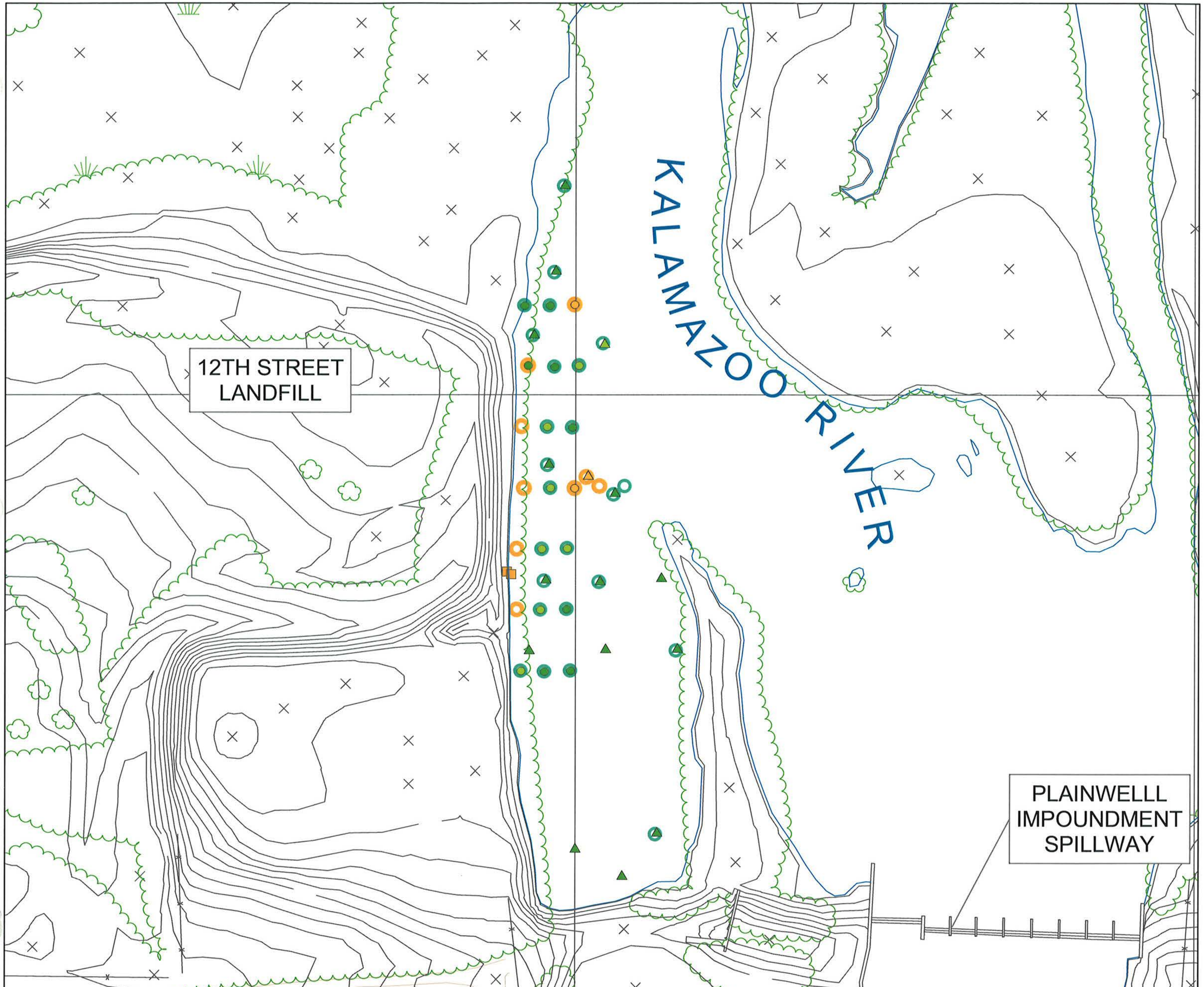
2.3.3 Landfill Gas Management

The objective of this investigation is the following:

- To collect readily accessible information about the subsurface landfill gas conditions at the 12th Street Landfill that may be useful in designing a passive gas venting system for the 12th Street Landfill.

The general scope of this field investigation is the following:

- Measure the concentrations of methane, carbon dioxide, and oxygen in the existing groundwater monitoring wells at the 12th Street Landfill that are screened in the vadose zone (MW-6A, MW-7A, and MW-8A), and in the Geoprobe® boreholes used to estimate the depth of the paper residuals along the property boundaries (see locations on Figure 2-3). Pressures that may have developed within the groundwater monitoring wells caused by excess landfill gas (if present) will also be measured. A passive gas venting system can be designed without the above information. If these data cannot be readily obtained, additional efforts will not be employed to collect the information.



LEGEND

BBL Data (2001) - Total PCBs mg/kg (USEPA, 2004)

- 0 - 1
- 1 - 4
- 4 - 50
- 50+

USEPA Data 2004 - Total PCBs (mg/kg)

- 0 - 1
- 1 - 4
- 4- 50
- 50+

Geraghty and Miller (1994) - Total PCBs (mg/kg)

- PCB Concentration 17 & 29 ppm

Powerhouse Channel Residuals

- No Visible Residuals
- Visible Residuals

NOTE

1. Concentrations presented are maximum at each sample location.

N

0 40 80 160 FEET

1:960

1 INCH EQUALS 80 FEET

WORKING COPY

PROJECT:	WEYERHAEUSER COMPANY MULTI-AREA QAPP PLAINWELL, MICHIGAN		
SHEET TITLE:	HISTORICAL SAMPLING DATA FOR THE FORMER POWERHOUSE DISCHARGE CHANNEL		
DRAWN BY: WEBERN	SCALE: AS NOTED	PROJ. NO.: 00-05117.03	
CHECKED BY: MK		FILE NO.: 51170309.mxd	
APPROVED BY: CJ	DATE PRINTED: 06/19/07	FIGURE 2-1	
DATE: JUNE 2007			

RMT

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Brookfield, WI 53045-5854
Phone: 262-879-1212
Fax: 262-879-1220

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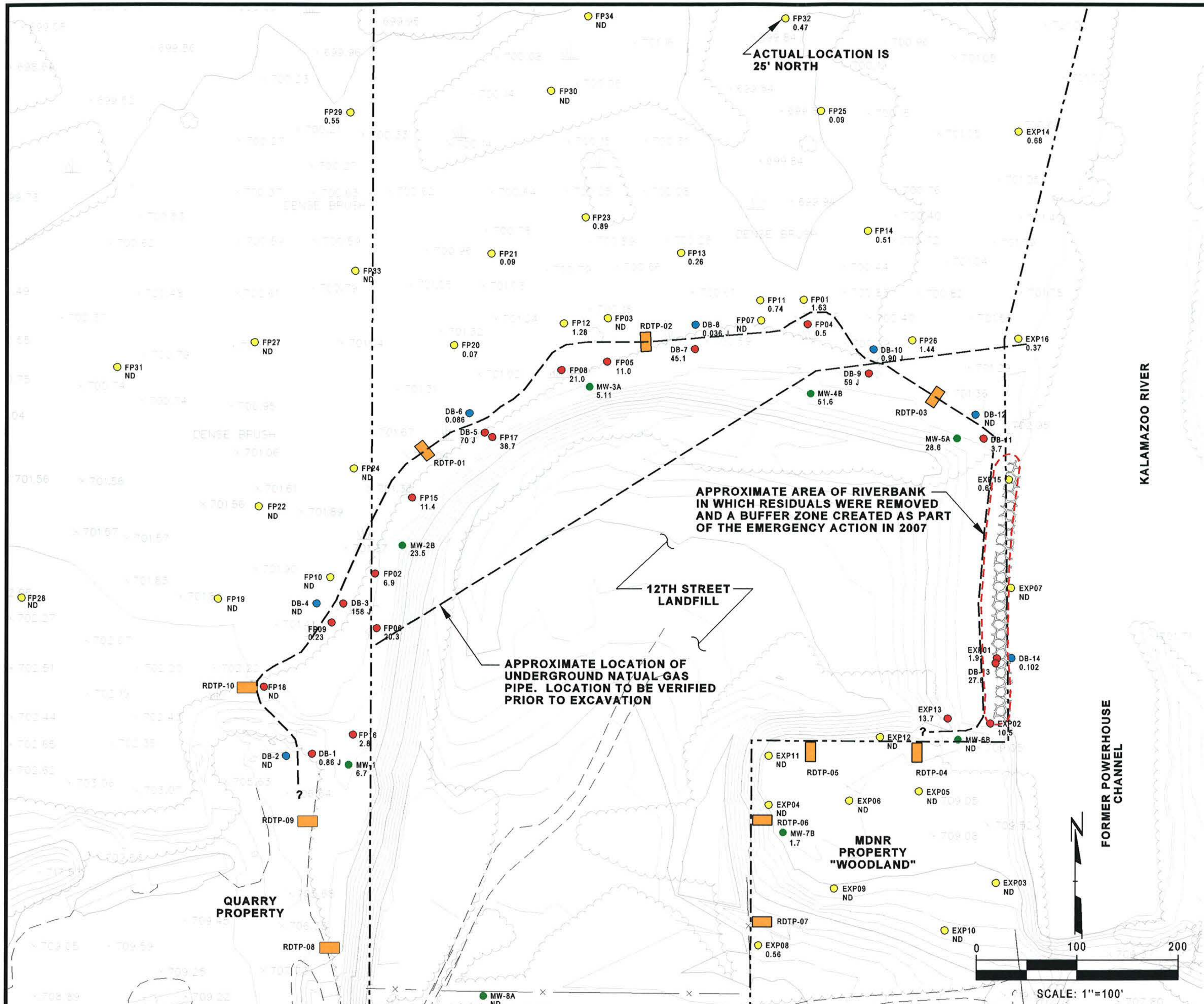

LEGEND

- RDTP-01 PROPOSED TEST PIT
- BORING LOCATION AT WHICH VISIBLE PAPER RESIDUALS WERE NOT PRESENT IN UPPER 24 INCHES
- BORING LOCATION AT WHICH VISIBLE PAPER RESIDUALS WERE DOCUMENTED IN BORING LOGS
- BORING LOCATION AT WHICH VISIBLE PAPER RESIDUALS WERE PRESUMED TO NOT HAVE BEEN IDENTIFIED (GIVEN THE OBJECTIVE OF THE INVESTIGATION), BUT WERE NOT DOCUMENTED (BORING LOGS ARE NOT AVAILABLE)
- MONITORING WELL
- APPROXIMATE PROPERTY BOUNDARY
- APPROXIMATE LIMITS OF PAPER RESIDUALS USING VISUAL CRITERIA

NOTES

1. RESULTS FOR THE "EXP" AND "FP" SAMPLING SERIES PROVIDED BY THE USEPA. THE SAMPLING WAS CONDUCTED BY THE USEPA IN SEPTEMBER AND OCTOBER 2003.
2. RESULTS FOR THE "DB-" SAMPLING SERIES ARE FROM THE ALLIED PAPER, INC./PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE REMEDIAL INVESTIGATION, TECHNICAL MEMORANDUM 8, GERAGHTY AND MILLER, INC. MAY 31, 1994.
3. THE APPROXIMATE LIMITS OF VISIBLE RESIDUALS CRITERIA WAS DERIVED FROM THE ALLIED PAPER, INC./PORTAGE CREEK / KALAMAZOO RIVER SUPERFUND SITE REMEDIAL INVESTIGATION, TECHNICAL MEMORANDUM 8, (GERAGHTY AND MILLER, INC. MAY 31, 1994,) AND REVISED BASED ON THE U.S.EPA'S 2003 PRECONSTRUCTION INVESTIGATION AND ON THE REMOVAL ACTIONS PERFORMED ALONG THE RIVERBANK IN 2007 AS PART OF THE EMERGENCY ACTION.
4. THE CONCENTRATIONS SHOW THE MAXIMUM CONCENTRATION (MG/KG) OF TOTAL PCBS IN EACH DEPTH INTERVAL AT EACH SAMPLE LOCATION.
5. PROPERTY BOUNDARY BASED ON LEGAL DESCRIPTION PROVIDED BY THE USEPA IN A FAX DATED MARCH 30, 2004. COORDINATES FOR S1/4 CORNER AND N 1/4 CORNER OF SECTION 24 AND NORTH BEARING USED TO PLOT PROPERTY LINE WERE PROVIDED BY HOLLAND ENGINEERING AND ARE BASED ON MICHIGAN STATE PLANE, SOUTH ZONE, NAD 83, US SURVEY FOOT COORDINATES.
6. CONCENTRATIONS QUALIFIED WITH A "J" FLAG ARE ESTIMATED. THE TOTAL CONCENTRATIONS ARE UNCERTAIN.

DRAFT

PROJECT: 12TH STREET LANDFILL MULTI-AREA QAPP - REVISION 2 OTSEGO TOWNSHIP, MICHIGAN			
SHEET TITLE: PROPOSED WETLAND, WOODLAND, AND QUARRY AREA PREDESIGN INVESTIGATIONS			
DRAWN BY: stormerl	SCALE: 1"=100'	PROJ. NO. 5117.02 \ Qapp	
CHECKED BY:		FILE NO. PRO INVEST.PLT	
APPROVED BY:	DATE PRINTED:	FIGURE 2-2	
DATE: FEBRUARY 2008			

RMT

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Fax: 608.831.3334

Ref. File 1 - J:\05117\02\Qapp\bmc120607.dgn (1) 1-3,5-9,23,27-29,32-63
Ref. File 2 - J:\05117\02\Qapp\bmrmt.dgn (2) bmr (2) 1-63
Ref. File 3 - J:\05117\02\Qapp\proposed.dgn (3) pro (3) 1-63
Ref. File 4 - J:\05117\02\Qapp\11x17bdr.dgn (4) border (4) 1-63

Design File - J:\05117\02\Qapp\pro invest.plt
stormerl - Tue Feb 19 14:20:33 2008
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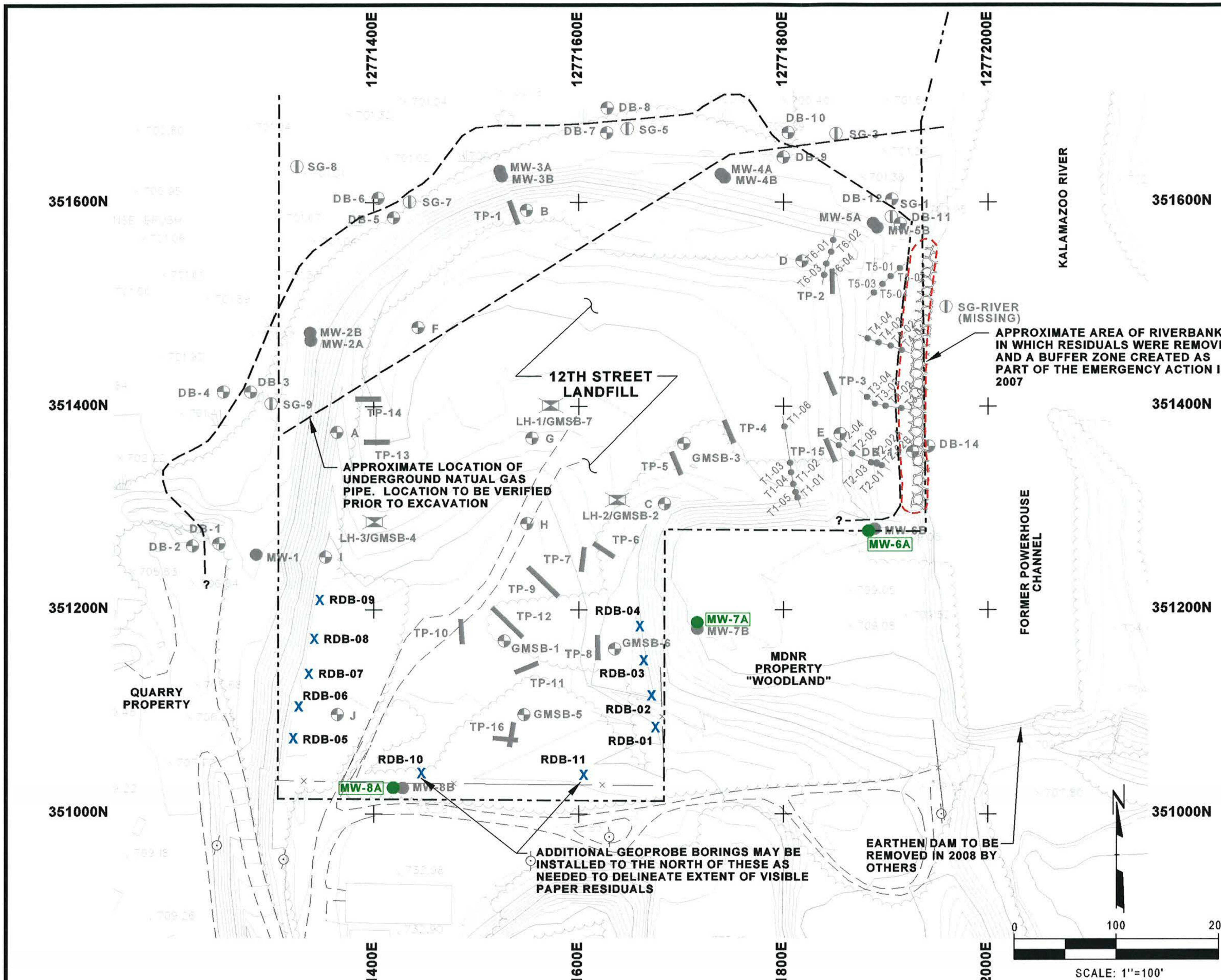

DRAFT

LEGEND

- APPROXIMATE PROPERTY BOUNDARY
- GRID LOCATION
- EXISTING UNPAVED ROAD
- EXISTING FENCE
- EXISTING BUILDING
- EXISTING 10' CONTOUR
- EXISTING 2' CONTOUR
- EXISTING SPOT ELEVATION
- EXISTING TREES AND/OR BRUSH
- EXISTING WETLAND LIMITS
- APPROXIMATE LIMITS OF PAPER RESIDUALS USING VISUAL CRITERIA
- EXISTING OVERHEAD ELECTRIC
- MW-10 — EXISTING MONITORING WELL
- MW-6A — EXISTING MONITORING WELL SCREENED IN VADOSE ZONE (POTENTIAL LANDFILL GAS MONITORING LOCATION)
- SG-3 — EXISTING STAFF GAUGE
- C — FORMER SOIL BORING
- LH-1/GMSB-7 — EXISTING LEACHATE HEADWELL
- TP-14 — FORMER TEST PIT
- T5-01 — FORMER GEOPROBE BORING
- X RDB-01 — PROPOSED GEOPROBE BORING

NOTES

1. BASE TOPOGRAPHY PROVIDED BY OAS, INC. OF SEYMOUR, INDIANA BASED ON AERIAL SURVEY DATED 3/30/2005. UPDATED TOPOGRAPHY FOR THE 12TH STREET LANDFILL WAS PROVIDED BY HOLLAND ENGINEERING, INC. SURVEY DATE: DECEMBER 6, 2007.
2. COORDINATES ARE MICHIGAN STATE PLANE-SOUTH ZONE. THE VERTICAL DATUM IS NGVD 29.
3. PROPERTY BOUNDARY BASED ON LEGAL DESCRIPTION PROVIDED BY U.S.EPA ON MARCH 30, 2004. COORDINATES FOR S 1/4 CORNER AND N 1/4 CORNER OF SECTION 24 AND NORTH BEARING USED TO PLOT PROPERTY LINE WERE PROVIDED BY HOLLAND ENGINEERING AND ARE BASED ON MICHIGAN STATE PLANE - SOUTH ZONE COORDINATES.
4. THE APPROXIMATE LIMITS OF VISIBLE RESIDUALS USING VISUAL CRITERIA WAS DERIVED FROM THE ALLIED PAPER, INC. /PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE REMEDIAL INVESTIGATION, TECHNICAL MEMORANDUM 8, (GERAGHTY AND MILLER, INC. MAY 31, 1994), AND REVISED BASED ON THE U.S. EPA'S 2003 PRECONSTRUCTION INVESTIGATION AND ON THE REMOVAL ACTIONS PERFORMED ALONG THE RIVERBANK IN 2007 AS PART OF THE EMERGENCY ACTION.

PROJECT:	12TH STREET LANDFILL MULTI-AREA QAPP - REVISION 2 OTSEGO TOWNSHIP, MICHIGAN		
SHEET TITLE:	PROPOSED LANDFILL PREDESIGN INVESTIGATIONS		
DRAWN BY: stormerl	SCALE: 1"=100'	PROJ. NO. 5117.02 \ Qapp	
CHECKED BY:		FILE NO. PROPOSED LI.PLT	
APPROVED BY:	DATE PRINTED:	FIGURE 2-3	
DATE: FEBRUARY 2008			

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Section 3 Document Overview

This Multi-Area QAPP has been developed in accordance with the Uniform Federal Policy (UFP) QAPP guidance (U.S. EPA, 2005a), which is composed of a series of 37 worksheets, along with a series of attachments. The worksheets provide information on project management, project objectives, measurement and data acquisition, project assessment and oversight, and data review. The attachments include chain-of-custody records, laboratory certifications, laboratory quality assurance plans, and laboratory standard operating procedures (SOPs). In accordance with the U.S. EPA guidance, cross-referencing is utilized where applicable, in order to streamline the document. This includes providing references to planning documents that are companion documents to this Multi-Area QAPP.

Section 4
References

Arcadis, BBL. 2007a. Former Plainwell impoundment time-critical removal action design report. Kalamazoo River Study Group, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. February 2007.

Arcadis BBL. 2007b. Multi-area quality assurance project plan (Rev. 00). Kalamazoo River Study Group, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. April 2007.

BBL. 1993. Remedial investigation/Feasibility study quality assurance project plan. Kalamazoo River Study Group, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. June 1993.

G&M. 1994. Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site remedial investigation/feasibility study, Technical Memorandum 8, 12th Street Landfill Operable Unit, Plainwell, Michigan. May 31, 1994.

RMT, Inc. 2006. Draft quality assurance project plan for the remedial investigation/feasibility study (Rev. 0), Plainwell Mill, Plainwell, Michigan. September 2006.

RMT, Inc. 2007a. Bathymetry and visual sediment assessment data quality objectives and work scope technical memorandum. Emergency response action, 12th Street Landfill (OU-4), Plainwell, Michigan. June 6, 2007.

RMT, Inc. 2007b. Geotechnical investigation data quality objectives and workscope technical memorandum. Emergency response action, 12th Street Landfill (OU-4), Plainwell, Michigan. May 11, 2007.

RMT, Inc. 2007c. Plainwell Mill banks emergency action design report. September 2007.

USDA. 2004. Wells, R., E.J. Langendoen, and A. Simon. Numerical simulation of sediment loads and channel changes along the Kalamazoo River between Plainwell and Otsego City, Michigan. USDA-ARS National Sedimentation Laboratory Research Report. No. 44. 46 pp.

USGS. 2004. Syed, A.U., J. P. Bennett, and C.M. Rachol. A pre-dam-removal assessment of sediment transport for four dams on the Kalamazoo River between Plainwell and Allegan, Michigan. U.S. Geological Survey Scientific Investigations Report 2004-5178. 41 p.

U.S. EPA. 1999. U.S. EPA contract laboratory program. National functional guidelines for organic data review. EPA 540/R-99/008. October 1999.

U.S. EPA. 2004. Final data summary report soil/sediment sampling results pre-design sampling. 12th Street Landfill, Operable Unit #4, Allied Paper, Inc./Portage Creek/Kalamazoo River Site, Plainwell, Michigan. July 2004.

U.S. EPA. 2005a. Uniform federal policy for quality assurance project plans. Evaluating, assessing, and documenting environmental data collection and use programs, Part 1: UFP-QAPP Manual (Version 1). Pub. Nos., EPA: EPA-505-B-04-900A, DoD: DTIC ADA 427785. March 2005.

U.S. EPA. 2005b. Uniform federal policy for quality assurance project plans. Part 2B, quality assurance/quality control compendium: minimum QA/QC activities (Version 1). Pub. Nos., EPA: EPA-505-B-04-900B, DoD: DTIC ADA 426957. March 2005.

QAPP Worksheet #1
Title and Approval Page

Site Name/Project Name:	Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Site Location:	Kalamazoo and Allegan Counties, including (but not limited to) 3 miles of Portage Creek and the Kalamazoo River from the City of Kalamazoo to Lake Michigan ▪ Operable Unit No. 4 - 12th Street Landfill ▪ Operable Unit No. 5 - Kalamazoo River ▪ Operable Unit No. 7 - Plainwell Mill
Document Title:	Multi-Area Quality Assurance Project Plan, Weyerhaeuser Company
Lead Organization:	U.S. EPA Region 5
Preparer's Name and Organizational Affiliation:	Kathryn Huibregtse, RMT, Inc.
Preparer's Contact Information:	150 North Patrick Blvd., Suite 180, Brookfield, WI 53045, 262.879.1212 kathy.huibregtse@rmtinc.com
Preparation Date:	Revision 00 - June 2007 Revision 01 - September 2007 (i.e., Addendum) Revision 02 - February 2008
Investigative Organization's Project Coordinator For Emergency Response Activities in the Former Powerhouse Discharge Channel (Operable Unit No. 4):	Signature: ____________ Jim Hutchens, RMT, Inc.
Investigative Organization's Project Coordinator For Emergency Response Activities for the 12th Street Landfill RD/RA (Operable Unit No. 4):	Signature: ____________ Linda Hicken, RMT, Inc.
Investigative Organization's Project QA Manager:	Signature: ____________ Kathryn Huibregtse, RMT, Inc.
Lead Organization's Program Manager for the 12th Street Landfill (Operable Unit No. 4):	Signature: ____________ Michael Berkoff, U.S. EPA Region 5
Lead Organization's Program Manager for the Kalamazoo River (Operable Unit No. 5):	Signature: ____________ Jim Saric, U.S. EPA Region 5
Lead Organization's Program Manager for the Plainwell Mill (Operable Unit No. 7):	Signature: ____________ Sam Chummar, U.S. EPA Region 5

Document Control Number: WEYCO-001

QAPP Worksheet #2
Identifying Information

Site Name/Project Name:	Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
Site Location:	Kalamazoo and Allegan Counties, including (but not limited to) 3 miles of Portage Creek and the Kalamazoo River from the city of Kalamazoo to Lake Michigan ▪ Operable Unit No. 4 - 12th Street Landfill ▪ Operable Unit No. 5 - Kalamazoo River ▪ Operable Unit No. 7 - Plainwell Mill
Site Number/Code:	MID006007306
Operable Unit:	Operable Units No. 4, 5, and 7
Contractor's Name:	NA
Contractor's Number:	NA
Contract Title:	NA
Work Assignment Number:	NA
Identify guidance used to prepare QAPP:	Uniform Federal Policy for Quality Assurance Project Plans, Manual VI (U.S. EPA, 2005a)
Identify regulatory program:	Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
Identify approval entity:	U.S. EPA Region 5
Indicate whether the QAPP is a generic or a project-specific QAPP:	This is a project-specific Multi-Area QAPP for emergency response activities at the 12th Street Landfill (Operable Unit No. 4), the Kalamazoo River banks (Operable Unit No. 5) adjacent to the Plainwell Mill, and for predesign investigations for the remedial design (RD) at the 12th Street Landfill (Operable Unit No. 4). This QAPP will be updated as required for future work at the 12th Street Landfill Site and/or other sites (*e.g.*, Plainwell Mill [Operable Unit No. 7]).
List dates of scoping sessions that were held:	Emergency Activities for the 12th Street Landfill: May 8, 2007, and June 6, 2007, at U.S. EPA Region 5 offices in Chicago, Illinois Emergency Activities for the Plainwell Mill Banks: August 14, 2007, Submittal of conceptual design approach and follow-up discussions regarding U.S. EPA comments Predesign Investigations for the RD for the 12th Street Landfill: December 7, 2007, at U.S. EPA Region 5 offices in Chicago, Illinois, and on January 9, 2008, via conference call.

QAPP Worksheet #2 (continued)
Identifying Information

List dates and titles of QAPP documents written for previous site work, if applicable:	
Quality Assurance Project Plan, organization partners (stakeholders), and connection with lead organization:	***(Site-Wide QAPP)*** Blasland & Bouck Engineers, P.C. 1993. Quality Assurance Project Plan, June 1993. Prepared on behalf of the Kalamazoo River Study Group (KRSG). Approved by the U.S. EPA Region 5 and the Michigan Department of Natural Resources (MDNR). Other stakeholders included the Michigan Department of Environmental Quality (MDEQ), the United States Fish & Wildlife Service, and the National Oceanic & Atmospheric Administration.
Quality Assurance Project Plan, organization partners (stakeholders), and connection with lead organization: (continued):	***(Operable Unit No. 5)*** Arcadis BBL, 2007b. Draft Multi-Area Quality Assurance Project Plan, April 2007. Prepared on behalf of the Kalamazoo River Study Group, for the Time-Critical Removal Action (TCRA) and the Supplemental Remedial Investigation/Feasibility Study (SRI/FS). Approved by the U.S. EPA Region 5 on May 22, 2007.
	(Operable Unit No. 7*)* RMT, 2006. Draft Quality Assurance Project Plan for the Remedial Investigation/Feasibility Study – Plainwell Mill, September 2006. Prepared on behalf of Weyerhaeuser Company. Project stakeholders include the MDEQ and the City of Plainwell. The document is under review by the U.S. EPA, with response pending.
List data users:	Weyerhaeuser Company, U.S. EPA Region 5
Lead Organization's Program Manager:	**Operable Unit No. 4:** Michael Berkoff, U.S. EPA Region 5 Remedial Project Manager (RPM) **Operable Unit No. 5**: Jim Saric, U.S. EPA Region 5 RPM **Operable Unit No. 7:** Sam Chummar, U.S. EPA Region 5 RPM

Worksheet #2 (*continued*)
Identifying Information

REQUIRED QAPP ELEMENT(S) AND CORRESPONDING QAPP SECTION(S) (U.S. EPA, 2005a)	REQUIRED INFORMATION	CROSSWALK TO RELATED INFORMATION AND DOCUMENTS
Project Management and Objectives		
2.1 Title and Approval Page	▪ Title and Approval Page	Worksheet #1, Title and Approval Page
2.2 Document Format and Table of Contents 2.2.1 Document Control Format 2.2.2 Document Control Numbering System 2.2.3 Table of Contents 2.2.4 QAPP Identifying Information	▪ Table of Contents ▪ QAPP Identifying Information	The Table of Contents is provided following the QAPP cover page. Worksheet #2, Identifying Information
2.3 Distribution List and Project Personnel Sign-Off Sheet 2.3.1 Distribution List 2.3.2 Project Personnel Sign-Off Sheet	▪ Distribution List ▪ Project Personnel Sign-Off Sheet	Worksheet #3, Distribution List; and Worksheets #4-1 and #4-2, Project Personnel Sign-Off Sheet
2.4 Project Organization 2.4.1 Project Organization Chart 2.4.2 Communication Pathways 2.4.3 Personnel Responsibilities and Qualifications 2.4.4 Special Training Requirements and Certification	▪ Project Organizational Chart ▪ Communication Pathways ▪ Personnel Responsibilities and Qualifications Table ▪ Special Personnel Training Requirements Table	Worksheets #5, Project Organization Charts; Worksheet #6, Communication Pathways; Worksheet #7, Personnel Responsibilities and Qualifications; and Worksheet #8, Special Personnel Training Requirements
2.5 Project Planning/Problem Definition 2.5.1 Project Planning (Scoping) 2.5.2 Problem Definition, Site History, and Background	▪ Project Planning Session ▪ Documentation (including Data Needs tables) ▪ Project Scoping Session Participants Sheet ▪ Problem Definition, Site History, and Background ▪ Site Maps (historical and current)	Worksheet #8, Special Personnel Training Requirements; Worksheets #9-1, 9-2, 9-3 and 9-4, Project Scoping Session Participants Sheet; and Worksheets #10-1, 10-2 and 10-3, Problem Definition-DQOs Site history and more detail concerning the project DQOs can be found in the companion documents to this Multi-Area QAPP. Site maps can be found on Figures 1-1, 1-2, and 2-1 through 2-3.

Worksheet 2 (*continued*)
Identifying Information

REQUIRED QAPP ELEMENT(S) AND CORRESPONDING QAPP SECTION(S) (U.S. EPA, 2005a)	REQUIRED INFORMATION	CROSSWALK TO RELATED INFORMATION AND DOCUMENTS
Project Management and Objectives		
2.6 Project Quality Objectives and measurement Performance Criteria	▪ Site-Specific Project Quality Objectives (PQOs) ▪ Measurement Performance Criteria Table	Worksheets # 11-1 through 11-3, Project Quality Objectives/Systematic Planning Process Statements. Worksheets #12-1 #12-2, and 12-3 Measurement Performance Criteria
2.6.1 Development of Project Quality Objectives Using the Systematic Planning Process		
2.6.2 Measurement performance Criteria		
2.7 Secondary Data Evaluation	▪ Sources of Secondary Data and Information ▪ Secondary Data Criteria and Limitations Table	Worksheets #13-1 and 13-2, Secondary Data Criteria and Limitations
2.8 Project Overview and Schedule	▪ Summary of Project Tasks ▪ Reference Limits and Evaluation Table ▪ Project Schedule/Timeline Table	Worksheet #14, Summary of Project Tasks; Worksheets #15-1 and #15-2, Reference Limits and Evaluation; and Worksheet #16-1 through 16-3, Project Schedules/Timelines.
2.8.1 Project Overview		
2.8.2 Project Schedule		

W

Worksheet 2 (*continued*)
Identifying Information

REQUIRED QAPP ELEMENT(S) AND CORRESPONDING QAPP SECTION(S) (U.S. EPA, 2005a)	REQUIRED INFORMATION	CROSSWALK TO RELATED INFORMATION AND DOCUMENTS
Measurement/Data Acquisition		
3.1 Sampling Tasks 3.1.1 Sampling Process Design and Rationale 3.1.2 Sampling Procedures and Requirements 3.1.2.1 Sampling Collection Procedures 3.1.2.2 Sample Containers, Volume, and Preservation 3.1.2.3 Equipment/Sample Container Cleaning and Decontamination Procedures 3.1.2.4 Field Equipment Calibration, Maintenance, Testing, and Inspection Procedures 3.1.2.5 Supply Inspection and Acceptance Procedures 3.1.2.6 Field Documentation Procedures	▪ Sampling Design and Rationale ▪ Sample Location Map ▪ Sampling Locations and Methods/ SOP Requirements Table ▪ Analytical Methods/SOP Requirements Table ▪ Field Quality Control Sample Summary Table ▪ Sampling SOPs ▪ Project Sampling SOP References Table ▪ Field Equipment Calibration, Maintenance, Testing, and Inspection Table	Worksheet #17-1 through 17-3, Sampling Design and Rationale; Worksheet #18-1 and 18-2, Sampling Locations and Methods/SOP Requirements; Worksheet #19, Analytical SOP Requirements (sample containers, preservation, and holding times); Worksheet #20, Field Quality Control Sample Summary Worksheet #21, Project Sampling SOP Reference; and Worksheet #22, Field Equipment Calibration, Maintenance, Testing, and Inspection The laboratory SOPs can be found in Attachment 1-5. More details concerning the sampling design and rationale and the field sampling procedures can be found in the companion documents to this Multi-Area QAPP.
3.2 Analytical Tasks 3.2.1 Analytical SOPs 3.2.2 Analytical Instrument Calibration Procedures 3.2.3 Analytical Instrument and Equipment Maintenance, Testing, and Inspection Procedures 3.2.4 Analytical Supply Inspection and Acceptance Procedures	▪ Analytical SOPs ▪ Analytical SOP References Table ▪ Analytical Instrument Calibration Table ▪ Analytical Instrument and Equipment Maintenance, Testing, and Inspection Table	Worksheet #23, Analytical SOP References; Worksheet #24, Analytical Instrument Calibration; and Worksheet #25, Analytical Instrument and Equipment Maintenance, Testing, and Inspection The laboratory SOPs can be found in Attachment 1-5.

Worksheet 2 (*continued*)
Identifying Information

REQUIRED QAPP ELEMENT(S) AND CORRESPONDING QAPP SECTION(S) (U.S. EPA, 2005a)	REQUIRED INFORMATION	CROSSWALK TO RELATED INFORMATION AND DOCUMENTS
Measurement/Data Acquisition (*continued*)		
3.3 Sample Collection Documentation, Handling, Tracking, and Custody Procedures 3.3.1 Sample Collection Documentation 3.3.2 Sample Handling and Tracking System 3.3.3 Sample Custody	▪ Sample Collection Documentation Handling, Tracking, and Custody SOPs ▪ Sample Container Identification ▪ Sample Handling Flow Diagram ▪ Example Chain-of-Custody Record and Seal	Worksheet #27, Sample Custody Requirements More details concerning the field sampling procedures can be found in the companion documents to this Multi-Area QAPP. Example COC forms can be found in Attachment 1-3.
3.4 Quality Control Samples 3.4.1 Sampling Quality Control Samples 3.4.2 Analytical Quality Control Samples	▪ QC Samples Table ▪ Screening/Confirmatory Analysis Decision Tree	Worksheet #28-1 through #28-4, Present QC sample information for project analysis
3.5 Data Management Tasks 3.5.1 Project Documentation and Records 3.5.2 Data Package Deliverables 3.5.3 Data Reporting Formats 3.5.4 Data Handling and Management 3.5.5 Data Tracking and Control	▪ Project Documents and Records Table ▪ Analytical Services Table ▪ Data Management SOPs	Worksheet #29, Project Documents and Records, and Worksheet #30, Analytical Services
4.1 Assessments and Response Actions 4.1.1 Planned Assessments 4.1.2 Assessment Findings and Corrective Action Responses	▪ Assessments and Response Actions ▪ Planned Project Assessments Table ▪ Audit Checklists ▪ Assessment Findings and Corrective Action Responses Table	Worksheet #31, Planned Project Assessments, and Worksheet #32, Assessment Findings and Corrective Action Responses The laboratory Quality Assurance Manual and Laboratory Policies and Guidelines documents can be found in Attachments 1-4 and 1-6, respectively.
4.2 QA Management Reports	▪ QA Management Reports Table	Worksheet #33, QA Management Reports
4.3 Final Project Report		

Worksheet 2 (*continued*)
Identifying Information

REQUIRED QAPP ELEMENT(S) AND CORRESPONDING QAPP SECTION(S) (U.S. EPA, 2005a)	REQUIRED INFORMATION	CROSSWALK TO RELATED INFORMATION AND DOCUMENTS
Data Review		
5.1 Overview		
5.2 Data Review Steps 5.2.1 Step I: Verification 5.2.2 Step II: Validation 5.2.2.1 Step IIa Validation Activities 5.2.2.2 Step IIb Validation Activities 5.2.3 Step III: Usability Assessment 5.2.3.1 Data Limitations and Actions from Usability Assessment 5.2.3.2 Activities	▪ Verification (Step I) Process Table ▪ Validation (Steps IIa and IIb) Process Table ▪ Validation (Steps IIa and IIb) Summary Table ▪ Usability Assessment	Worksheet #34, Verification (Step 1) Process; Worksheet #35, Validation (Step I) Process; Worksheet #36, Validation (Steps IIa and IIb) Summary; and Worksheet #37, Usability Assessment.
5.3 Streamlining Data Review 5.3.1 Data Review Steps To Be Streamlined 5.3.2 Criteria for Streamlining Data Review 5.3.3 Amounts and Types of Data Appropriate for Streamlining	▪ None	NA

QAPP Worksheet #3
Distribution List

QAPP RECIPIENTS	TITLE	ORGANIZATION	TELEPHONE NUMBER	E-MAIL ADDRESS	DOCUMENT CONTROL NUMBER
Michael Berkoff (2 copies)	Remedial Project Manager	U.S. EPA, Region 5	312.353.8983	berkoff.michael@epa.gov	WEYCO-001
Sam Chummar (2 copies)	Remedial Project Manager	U.S. EPA, Region 5	312.886.1434	Chummar.Sam@epamail.epa.gov	WEYCO-001
Jim Saric	Remedial Project Manager	U.S. EPA, Region 5	312. 886.0992	Saric.james@epa.gov	WEYCO-001
Jennifer Hale	Environmental Manager	Weyerhaeuser Company	253.924.3746	jennifer.hale@weyerhaeuser.com	WEYCO-001
Martin Lebo	Senior Aquatic Scientist	Weyerhaeuser Company	252.633.7511	martin.lebo@weyerhaeuser.com	WEYCO-001
Jim Hutchens	Senior Project Manager	RMT	262.879.1212	james.hutchens@rmtinc.com	WEYCO-001
Linda Hicken	Senior Project Manager	RMT	608.662.5307	linda.hicken@rmtinc.com	WEYCO-001
Kathy Huibregtse	Principal-In-Charge	RMT	262.879.1212	kathy.huibregtse@rmtinc.com	WEYCO-001
Jennifer Overvoorde	Field Sampling Coordinator and Health and Safety Officer	RMT	616.975.5415	jennifer.overvoorde@rmtinc.com	WEYCO-001
Jeff Macri	Construction Manager	RMT	317.490.2865 (mobile)	jeff.macri@rmtinc.com	WEYCO-001
Mike Amstadt	Senior Project Engineer	RMT	608.662.5271	mike.amstadt@rmtinc.com	WEYCO-001

QAPP Worksheet #3 (continued)
Distribution List

QAPP RECIPIENTS	TITLE	ORGANIZATION	TELEPHONE NUMBER	E-MAIL ADDRESS	DOCUMENT CONTROL NUMBER
Tom Stolzenburg	Data QA Manager	RMT	608.662.5287	tom.stolzenburg@rmtinc.com	WEYCO-001
Cheryl Shaw	Database Manager	RMT	608.662.5117	cheryl.shaw@rmtinc.com	WEYCO-001
Dennis Catalano	Laboratory QA/QC Manager	WATS	253.924.6242	dennis.catalano@weyerhaeuser.com	WEYCO-001

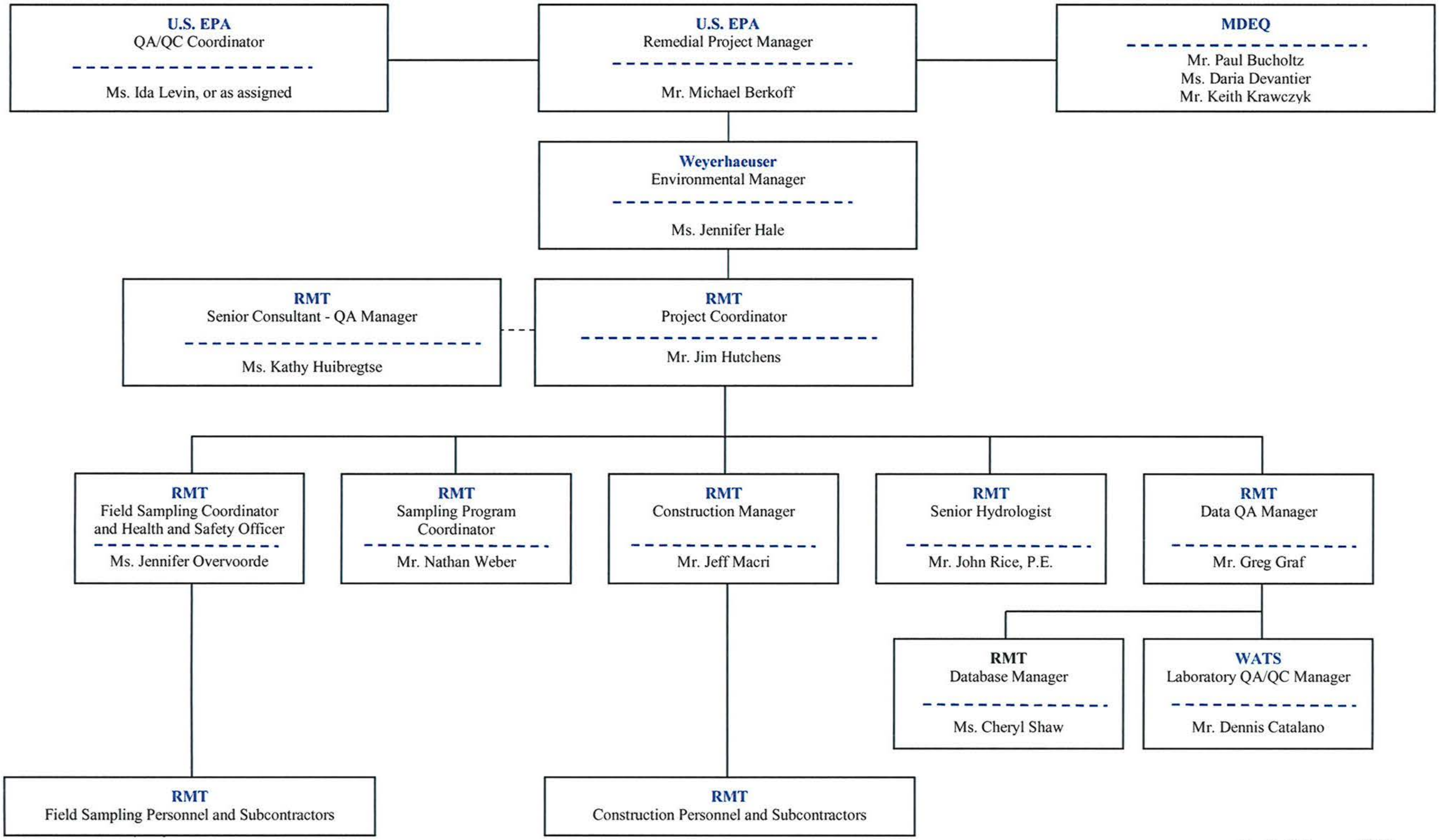
QAPP Worksheet #4-1
Project Personnel Sign-Off Sheet (RMT)

PROJECT PERSONNEL	TITLE	TELEPHONE NUMBER	SIGNATURE	DATE QAPP READ
Jim Hutchens	Senior Project Manager	262.879.1212		
Linda Hicken	Senior Project Manager	608.662.5307		
Kathy Huibregtse	Principal-In-Charge	262.879.1212		
Jennifer Overvoorde	Field Sampling Coordinator and Health and Safety Officer	616.975.5415		
Jeff Macri	Construction Manager	317.490.2865		
Mike Amstadt	Senior Project Engineer	608.662.5271		
Tom Stolzenburg	Data QA Manager	608.662.5287		
Cheryl Shaw	Database Manager	608.662.5117		

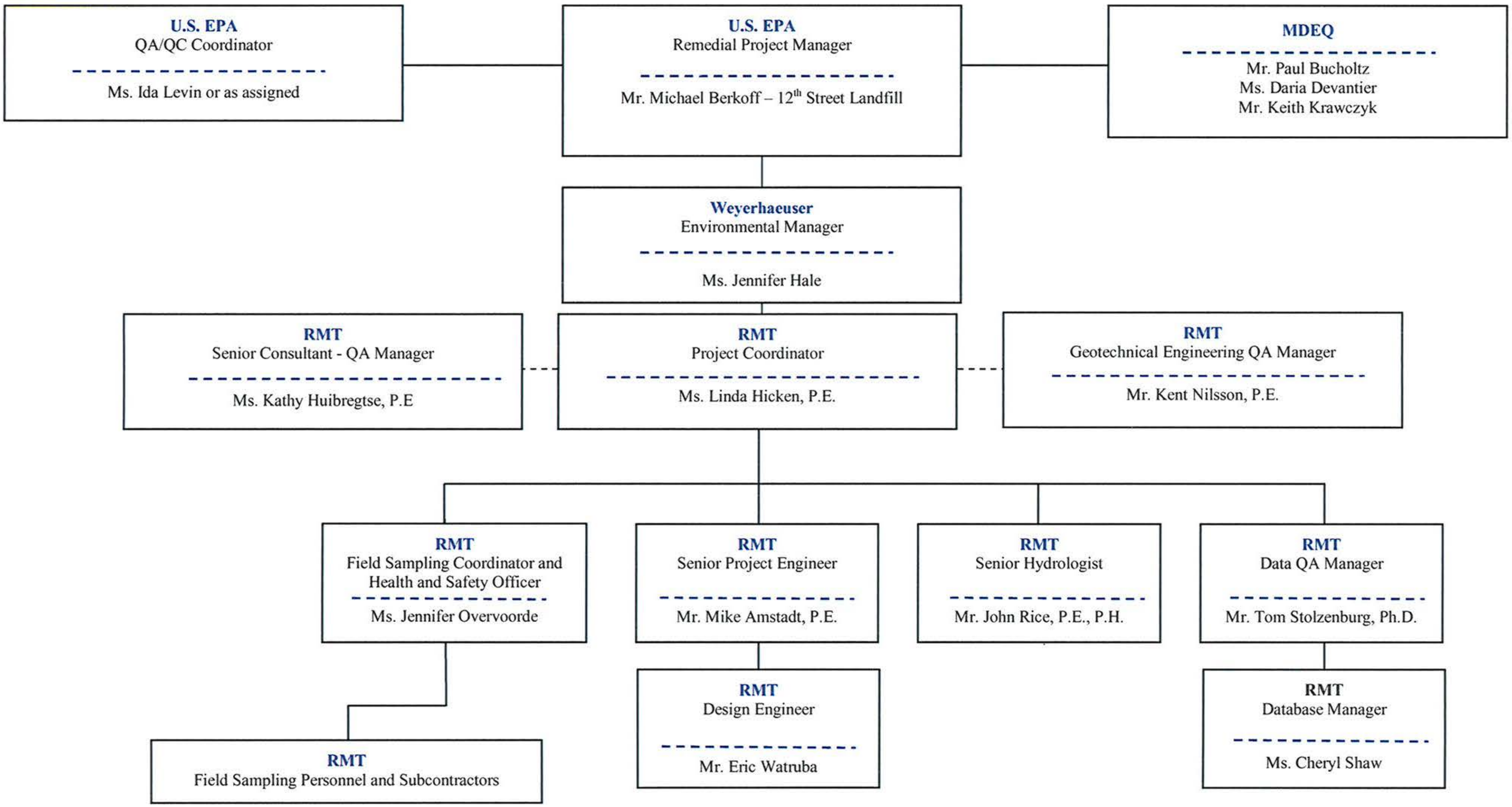
QAPP Worksheet #4-2
Project Personnel Sign-Off Sheet (WATS)

PROJECT PERSONNEL	TITLE	TELEPHONE NUMBER	SIGNATURE	DATE QAPP READ
Dennis Catalano	Laboratory QA/QC Manager	253.924.6242		

QAPP Worksheet #5-1
Project Organizational Chart
(Emergency Response Activities for the 12th Street Landfill and the Plainwell Mill Banks)



QAPP Worksheet #5-2
Project Organizational Chart
(Predesign Investigations for the Remedial Design for the 12th Street Landfill)



QAPP Worksheet #6-1
Communication Pathways
(Emergency Response Activities For the 12th Street Landfill and the Plainwell Mill Banks)

COMMUNICATION DRIVERS	RESPONSIBLE ENTITY	NAME	TELEPHONE NUMBER	PROCEDURE (timing, pathways, etc.)
Emergency Response Activities in the Former Powerhouse Discharge Channel (Operable Unit No. 4)				
Serve as Point-of-Contact with U.S. EPA Remedial Project Manager (RPM)	Environmental Manager	Jennifer Hale, Weyerhaeuser Company	253.924.3746	Jennifer Hale will provide project submittals to Michael Berkoff, U.S. EPA, in accordance with the schedule provided on Worksheet No. 16 of this QAPP.
Manage all project phases	Project Coordinator	Jim Hutchens, RMT	262.879.1212	Jim Hutchens will be the RMT liaison to the U.S. EPA for emergency response activities in the former powerhouse discharge channel at the 12th Street Landfill site.
Coordinate field program	Field Sampling Coordinator and Health and Safety Officer	Jennifer Overvoorde, RMT	616.975.5415	Jennifer Overvoorde will provide Jim Hutchens with an update of field sampling activities, including related questions or problems, by telephone or e-mail at the end of each business day. Jennifer Overvoorde will also report any QA/QC problems related to field measurements to the Data QA Manager (Greg Graf) by telephone or e-mail by the end of the same business day.
Provide daily progress reports – field sampling	Field Sampling Coordinator and Health and Safety Officer	Jennifer Overvoorde, RMT	616.975.5415	Jennifer Overvoorde will provide Jim Hutchens with written daily progress reports, including field records, sampling logs, Chain-of-Custody Records, and any other pertinent information by e-mail or fax within 2 business days.
Notify Jim Hutchens and the Data QA Manager of any QAPP changes in the field	Field Sampling Coordinator and Health and Safety Officer	Jennifer Overvoorde, RMT	616.975.5415	Jennifer Overvoorde will notify Jim Hutchens and the Data QA Manager (Greg Graf) on the same business day of any changes to the QAPP made in the field, including the reasons, by telephone or e-mail.

QAPP Worksheet #6-1 (*continued*)
Communication Pathways
(Emergency Response Activities for the 12th Street Landfill and the Plainwell Mill Banks)

COMMUNICATION DRIVERS	RESPONSIBLE ENTITY	NAME	TELEPHONE NUMBER	PROCEDURE (timing, pathways, etc.)
Coordinate construction activities	Construction Manager	Jeff Macri, RMT	317.490.2865	Jeff Macri will provide Jim Hutchens with an update of construction activities, including related questions or problems, by telephone or e-mail at the end of each business day.
Daily progress reports – construction activities	Construction Manager	Jeff Macri, RMT	317.490.2865	Jeff Macri will provide Jim Hutchens with written daily progress reports, including field records and any other pertinent information, by e-mail or fax within 2 business days.
Reporting lab data quality issues	Laboratory QA/QC Manager	Dennis Catalano, WATS	253.924.6242	Dennis Catalano will notify the Data QA Manager (Greg Graf) with any QA/QC issues within 2 business days.
Field and analytical corrective actions	Data QA Manager	Greg Graf, RMT	608.662.5306	Greg Graf will determine the need for corrective action for field and analytical issues, in conjunction with the Project Coordinator, the Field Sampling Coordinator, or the Laboratory QA/QC Manager, as appropriate.
Release of final analytical data	Data QA Manager	Greg Graf, RMT	608.662.5306	No final analytical data can be released until validation is complete and Greg Graf has approved the release.
QAPP amendments	Data QA Manager	Greg Graf, RMT	608.662.5306	Any major changes to the QAPP must be approved by Greg Graf, the Project Coordinator, and the U.S. EPA before the changes can be implemented.

QAPP Worksheet #6-2
Communication Pathways
(Predesign Investigations for the Remedial Design for the 12th Street Landfill)

COMMUNICATION DRIVERS	RESPONSIBLE ENTITY	NAME	TELEPHONE NUMBER	PROCEDURE (timing, pathways, etc.)
Serve as Point-of-Contact with U.S. EPA Remedial Project Manager (RPM)	Environmental Manager	Jennifer Hale, Weyerhaeuser Company	253.924.3746	Jennifer Hale will provide project submittals to the U.S. EPA RPM associated with the applicable OU, in accordance with the schedule provided on Worksheet No. 16-2 of this QAPP.
Manage all project phases	Project Coordinator	Linda Hicken, RMT	608.662.5307	Linda Hicken will be the RMT liaison to the U.S. EPA for the remedial design for the 12th Street Landfill site.
Coordinate field program	Field Sampling Coordinator and Health and Safety Officer	Jennifer Overvoorde, RMT	616.975.5415	Jennifer Overvoorde will provide Linda Hicken with an update of field sampling activities, including related questions or problems, by telephone or e-mail at the end of each business day. Jennifer Overvoorde will also report any QA/QC problems related to field measurements to the Data QA Manager (Tom Stolzenburg) by telephone or e-mail by the end of the same business day.
Provide daily progress reports – field sampling	Field Sampling Coordinator and Health and Safety Officer	Jennifer Overvoorde, RMT	616.975.5415	Jennifer Overvoorde will provide Linda Hicken with written daily progress reports, including field records and any other pertinent information by e-mail or fax within 2 business days.
Notify Linda Hicken and the Data QA Manager of any QAPP changes in the field	Field Sampling Coordinator and Health and Safety Officer	Jennifer Overvoorde, RMT	616.975.5415	Jennifer Overvoorde will notify Linda Hicken and the Data QA Manager (Tom Stolzenburg) on the same business day of any changes to the QAPP made in the field, including the reasons, by telephone or e-mail.

QAPP Worksheet #6-2 (*continued*)
Communication Pathways
Predesign Investigations for the Remedial Design for the 12th Street Landfill

COMMUNICATION DRIVERS	RESPONSIBLE ENTITY	NAME	TELEPHONE NUMBER	PROCEDURE (timing, pathways, etc.)
Field corrective actions	Senior Project Engineer	Mike Amstadt, RMT	608.662.5271	Mike Amstadt will determine the need for corrective action for field issues, in conjunction with the Project Coordinator, or the Field Sampling Coordinator, as appropriate.
QAPP amendments	Data QA Manager	Tom Stolzenburg, RMT	608.662.5306	Any major changes to the QAPP must be approved by Tom Stolzenburg, the Project Coordinator, and the U.S. EPA before the changes can be implemented.

QAPP Worksheet #7
Personnel Responsibilities and Qualifications

NAME	PROJECT ROLE	ORGANIZATIONAL AFFILIATION	EDUCATION AND EXPERIENCE QUALIFICATIONS
Michael Berkoff Sam Chummar	Remedial Project Manager - 12th Street Landfill Remedial Project Manager - Plainwell Mill	U.S. EPA, Region 5	Designated as the U.S. EPA's Project Coordinators
Jennifer Hale	Environmental Manager	Weyerhaeuser	B.S. in ecology and evolutionary biology, with a combined minor in chemistry, physics and mathematics, University of Arizona, 1998 Over 5 years of experience
Kathryn Huibregtse, P.E.	Senior Consultant - QA/QC Manager	RMT	B.S. chemical engineering, University of Wisconsin (UW)-Madison, 1974 Over 28 years of experience
Jim Hutchens, P.E.	Project Coordinator	RMT	B.S. mining engineering, University of Wisconsin (UW)-Platteville, 1981 Over 20 years of experience
Linda Hicken, P.E.	Project Coordinator	RMT	MBA, University of Southern California, 1983 B.S. chemical engineering, University of Michigan-Ann Arbor, 1980 28 years of experience
Nathan Weber	Sampling Program Coordinator	RMT	B.S. chemical engineering, University of Wisconsin (UW)-Madison, 2003 Over 4 years of experience
Eric Watruba	Sampling Program Coordinator/Design Engineer	RMT	B.S. geological engineering, University of Wisconsin (UW)-Madison, 2004 B.S. geology and geophysics, University of Wisconsin(UW)-Madison, 2004 3 years of experience
Jeff Macri	Construction Manager	RMT	MBA, University of Indianapolis, 1996 B.S. chemistry, Butler University, 1985 20 years of experience
John Rice, P.E., P.H.	Senior Hydrologist	RMT	M.S. civil environmental engineering, University of Wisconsin (UW)-Madison, 1984 B.S civil environmental engineering, University of Wisconsin (UW)-Madison, 1982 Over 23 years of experience
Mike Amstadt, P.E.	Senior Project Engineer	RMT	B.S. civil and environmental engineering, University of Wisconsin (UW)-Madison, 1990 17 years of experience
Tom Stolzenburg, Ph.D.	Data QA Manager	RMT	Ph.D., civil and environmental engineering, water chemistry program, University of Wisconsin - Madison, 1979, B.S., resource management and biology, UW-Stevens Point, 1974. Over 28 years of experience.

QAPP Worksheet #7 (continued)
Personnel Responsibilities and Qualifications

NAME	PROJECT ROLE	ORGANIZATIONAL AFFILIATION	EDUCATION AND EXPERIENCE QUALIFICATIONS
Kent Nilsson, P.E.	Geotechnical Engineering QA Manager	RMT	B.S. civil engineering, Brigham Young University, 1983 M.E.M. civil engineering, Brigham Young University, 1984 23 years experience
Jennifer Overvoorde	Field Coordinator and Health and Safety Officer	RMT	B.A. geology, Calvin College, 1998 Over 10 years of experience
Cheryl Shaw	Database Manager	RMT	Chemistry course work, University of Wisconsin (UW)-Madison 8 years of experience
Dennis Catalano	Laboratory QA/QC Manager	WATS	B.S. biology with chemistry minor, University of Dayton, 1977 30 years of experience

QAPP Worksheet #7 (*continued*)
Personnel Responsibilities and Qualifications

U. S. EPA

Project Coordinator

- Serve as the primary point-of-contact for the U.S. EPA.
- Review and approve project submittals.
- Coordinate with the Michigan DEQ and other regulatory agencies as needed.
- Monitor project activities.

QA/QC Coordinator

- Review and approve the QAPP.
- Review and approve relevant portions of submitted documents to ensure compliance with the QAPP.
- Coordinate audits, as necessary.

WEYERHAEUSER COMPANY

Environmental Manager

- Serve as the primary point-of-contact between Weyerhaeuser Company and the U.S. EPA.
- Coordinate communications between Weyerhaeuser, RMT, the U.S. EPA, and other parties.
- Review draft project deliverables prior to their submittal to the U.S. EPA.

RMT

Project Coordinator

- Serve as the primary point-of-contact for RMT.
- Communicate with Weyerhaeuser Company, the U.S. EPA, and other project stakeholders.
- Establish and communicate project milestones and schedules.
- Coordinate and review RMT work products.
- Direct RMT team members.

QAPP Worksheet #7 (*continued*)
Personnel Responsibilities and Qualifications

Senior Consultant – QA Manager

- Provide overall quality assurance, including a review of RMT's performance on the project.
- Review project progress and RMT work products for compliance with project objectives and requirements.
- Provide input regarding Superfund procedures and compliance with the National Contingency Plan (NCP).

Field Sampling Coordinator and Health and Safety Officer

- Coordinate environmental staff who will be measuring and recording field parameters, collecting samples, and documenting construction activities, to ensure compliance with this QAPP.
- Order sample bottles from the laboratory.
- Prepare reports pertaining to relevant field activities.
- Maintain field and laboratory files, including project documentation, sample logs, and calculations; and provide complete copies to the RMT Project Coordinator.
- Provide on-site Health and Safety Orientation to all RMT staff and subcontractors, and monitor site activities for compliance with the project Health and Safety Plan.
- Conduct field audits, as necessary.

Sampling Program Coordinator/Design Engineer

- Review existing data, project objectives, and regulatory guidance to assist in the development of project sampling protocols.
- Review and summarize the results of data collected during project implementation, and make preliminary recommendations to the RMT Project Coordinator regarding the results (*e.g.*, whether additional data collection or field modifications appear to be necessary).

Construction Manager

- Coordinate and direct subcontractors and RMT personnel who are performing construction work (*e.g.*, site preparation, excavation).
- Assist Field Sampling Coordinator with Health and Safety Orientations for construction-related activities.
- Maintain field records related to construction activities, and provide complete copies to the RMT Project Coordinator.

Senior Hydrologist

- Provide technical input during the planning, design, and implementation stages of the project.
- Review the technical aspects of RMT's submittals.
- Serve as the professional engineer of record for work related to hydrology.

QAPP Worksheet #7 (*continued*)
Personnel Responsibilities and Qualifications

Senior Project Engineer

- Provide technical input during the planning, design, and implementation stages of the project.
- Review the technical aspects of RMT's submittals.
- Serve as the professional engineer of record for work related to landfill design.

Geotechnical Engineering QA Manager

- Provide technical input during the planning, design, and implementation stages of the project.
- Review the technical aspects of RMT's submittals.

Data QA Manager

- Serve as the primary point-of-contact with the laboratory.
- Coordinate field QA/QC procedures with the Field Coordinator (*e.g.*, calibrations for field analytical measurements, and field audits, as necessary), and review pertinent field records for compliance with this Quality Assurance Project Plan (QAPP).
- Review laboratory QA/QC procedures and documentation, as provided in data deliverables.
- Review data for compliance with the Data Quality Objectives (DQOs) for the project.
- Oversee data validation activities and the preparation of QA/QC reports by the 3rd party data validator.

Database Manager

- Establish and maintain a project database.
- Import electronic data deliverables (EDDs) provided by the laboratory into the project database.
- Perform a QA/QC check of imported data versus the hard copy data.
- Transcribe field and non-EDD laboratory data into the project database, as necessary.
- Tabulate data for end users.

ANALYTICAL LABORATORY

Laboratory QA/QC Manager

- Serve as the primary point-of-contact for the laboratory.
- Oversee preparation of analytical reports.

- Verify that the laboratory meets the QA/QC standards specified in this QAPP.
- Supervise in-house chain-of-custody.
- Perform laboratory audits, in accordance with this QAPP.

QAPP Worksheet #8
Special Personnel Training Requirements

PROJECT FUNCTION	SPECIALIZED TRAINING - TITLE OR DESCRIPTION OF COURSE	TRAINING PROVIDER	TRAINING DATE	PERSONNEL/ GROUPS RECEIVING TRAINING	PERSONNEL TITLES/ ORGANIZATIONAL AFFILIATION	LOCATION OF TRAINING RECORDS/ CERTIFICATES
Field activities	40-hour HAZWOPER and 8-hour HAZWOPER refresher	Certified training professionals	8-hour refresher within previous year	Field personnel	RMT personnel	RMT project offices
Analytical chemistry	No state laboratory certification program in Michigan[1]	N/A	N/A	N/A	Weyerhaeuser Analysis and Testing Services (WATS) Weyerhaeuser Company Mail Stop: WTC2F25 32901 Weyerhaeuser Way Federal Way, WA 98001 Dennis Catalano 253.924.6242	N/A

Footnote:
(1) WATS is certified by the State of Washington.

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QAPP Worksheet #9-1
Project Scoping Session Participants Sheet (May 8, 2007)

Project Name: Emergency Response Activities for Operable Unit No. 4

Projected Date(s) of Sampling: 2007 **Site Name:** Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

RMT Project Managers: Jim Hutchens (former powerhouse discharge channel) and Linda Hicken (12th Street Landfill) **Location of Scoping Session:** U.S. EPA Region 5, Chicago, Illinois

Date of Session: May 8, 2007

Scoping Session Purpose: To discuss the administrative mechanism for implementing actions at the 12th Street Landfill O.U. to accommodate the KRSG's Time Critical Removal Action, and to discuss the objectives and scope of a geotechnical investigation necessary to design a stable sideslope of the landfill along the river to accommodate the TCRA.

NAME	TITLE	AFFILIATION	TELEPHONE NUMBER	E-MAIL ADDRESS	PROJECT ROLE
Eileen Furey	Associate Regional Counsel	U.S. EPA, Region 5	312.886.7950	furey.eileen@epa.gov	Counsel for U.S. EPA
Tim Prendiville	Remedial Project Manager	U.S. EPA, Region 5	312.886.5122	prendiville.timothy@epa.gov	(Outgoing) Project Coordinator for 12th Street Landfill
Michael Berkoff	Remedial Project Manager	U.S. EPA, Region 5	312.353.8983	berkoff.michael@epa.gov	(Incoming) Project Coordinator for 12th Street Landfill
Ida Levin	Superfund Division Quality Assurance - Team Leader	U.S. EPA, Region 5	312.886.6254	levin.ida@epa.gov	U.S. EPA QA/QC Coordinator
Sam Borries	On-Scene Coordinator	U.S. EPA, Region 5	312.353.8360	borries.samuel@epa.gov	On-Scene Coordinator for the TCRA
Daria Devantier (by telephone)	Superfund Section - Specialized Sampling Unit - Team Leader	MDEQ	517.373.8436	devantid@michigan.gov	MDEQ Regulatory Support
Paul Bucholtz (by telephone)	Superfund Section - Specialized Sampling Unit - Project Manager	MDEQ	517.373.8174	bucholtp@michigan.gov	MDEQ Project Manager
Keith Krawczyk (by telephone)	Superfund Section - Specialized Sampling Unit - Project Manager	MDEQ	517.335.1104	krawczyk@michigan.gov	MDEQ Regulatory Support

QAPP Worksheet #9-1 (*continued*)
Project Scoping Session Participants Sheet (May 8, 2007)

NAME	TITLE	AFFILIATION	TELEPHONE NUMBER	E-MAIL ADDRESS	PROJECT ROLE
Jennifer Hale	Environmental Manager	Weyerhaeuser Company	253.924.3746	jennifer.hale@weyerhaeuser.com	Project Coordinator for Weyerhaeuser
Martin Lebo, Ph.D (by telephone)	Senior Aquatic Scientist	Weyerhaeuser Company	252.633.7511	martin.lebo@weyerhaeuser.com	Weyerhaeuser technical review
Joe Jackowski (by telephone)	Senior Legal Counsel	Weyerhaeuser Company	253.924.3461	joe.jackowski@weyerhaeuser.co m	Counsel for Weyerhaeuser
Mark Schneider (by telephone)	Attorney at Law	Perkins Coie	206.359.8627	mwschneider@perkinscoie.com	Outside Counsel for Weyerhaeuser
Jeff Keiser	Project Manager	CH2M Hill	414.847.0382	jeff.keiser@ch2m.com	Oversight Contractor to the U.S. EPA
Linda Hicken	Senior Project Manager	RMT, Inc.	608.662.5307	linda.hicken@rmtinc.com	RMT Project Manager for 12th Street Landfill RD/RA
Jim Hutchens	Senior Project Manager	RMT, Inc.	262.879.1212	james.hutchens@rmtinc.com	RMT Project Manager for Emergency Actions in the former powerhouse discharge channel
Kathy Huibregtse	Principal-In-Charge	RMT, Inc.	262.879.1212	kathy.huibregtse@rmtinc.com	Senior Consultant - QA Manager

QAPP Worksheet #9-1 (*continued*)
Project Scoping Session Participants Sheet (May 8, 2007)

Comments/Decisions:

- Michael Berkoff is the new U.S. EPA Remedial Project Manager for all the landfill operable units on the Kalamazoo River. Weyerhaeuser will communicate directly with him going forward.
- The U.S. EPA decided that the removal of sediment in the former powerhouse discharge channel and work on the 12th Street Landfill necessary to accommodate the Time Critical Removal Action (TCRA) by the Kalamazoo River Study Group (KRSG) should proceed as an emergency response action, as defined under Section XVII, paragraph 67 of Weyerhaeuser's Consent Decree with the U.S. EPA.
- The Statement of Work for the Remedial Design and Remedial Action for the 12th Street Landfill should ultimately be modified to reflect the change in the order of implementing the required tasks.
- Weyerhaeuser can either prepare its own QAPP for the emergency response activities, or have Arcadis BBL (on behalf of the KRSG) collect samples under the KRSG's QAPP, once it is approved by the U.S. EPA.
- Work schedules need to be coordinated with the KRSG. The KRSG wants to remove the coffer dam this fall to avoid ice damage and to possibly proceed with Phase 2.

Action Items:

- Weyerhaeuser is to submit a document describing the Data Quality Objectives (DQOs) and the scope of a geotechnical investigation of the reported berm along the riverfront of the landfill. Weyerhaeuser is to also submit a Health and Safety Plan for the geotechnical investigation.
- Weyerhaeuser is to review the U.S. EPA's new format for QAPPs and the KRSG's QAPP for the TCRA, and decide on which format to use for the QAPP for the emergency response activities.

Consensus Decisions:

- Weyerhaeuser can submit a QAPP for the emergency response activities in either the old or the new format.

QAPP Worksheet #9-2
Project Scoping Session Participants Sheet (June 6, 2007)

Project Name: Emergency Response Activities for the 12th Street Landfill (Operable Unit No. 4)

Projected Date(s) of Sampling: 2007 **Site Name:** Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Project Manager: Jim Hutchens, RMT **Location of Scoping Session:** U.S. EPA Region 5 offices, Chicago, Illinois

Date of Session: June 6, 2007

Scoping Session Purpose: Update meeting on former powerhouse discharge channel emergency actions. Specific purpose: to present an overview of the emergency response actions being designed; to review initial results from the geotechnical evaluation; to discuss bathymetric and visual sediment assessment data needs; to refine communication procedures, and to update the construction schedule. New team member from the U.S. EPA was introduced.

NAME	TITLE	AFFILIATION	TELEPHONE NUMBER	E-MAIL ADDRESS	PROJECT ROLE
Eileen Furey	Associate Regional Counsel	U.S. EPA, Region 5	312.886.7950	furey.eileen@epa.gov	Counsel for U.S. EPA
Jennifer Hale	Environmental Manager	Weyerhaeuser Company	253.924.3746	jennifer.hale@weyerhaeuser.com	Project Manager for Weyerhaeuser
Michael Berkoff	Remedial Project Manager	U.S. EPA, Region 5	312.353.8983	berkoff.michael@epa.gov	Remedial Project Manager for 12th Street Landfill
Sam Borries	On-Scene Coordinator	U.S. EPA, Region 5	312.353.8360	borries.samuel@epa.gov	On-Scene Coordinator for the TCRA
Jim Saric	Remedial Project Manager	U.S. EPA, Region 5	312.886.0992	saric.james@epa.gov	Remedial Project Manager for Kalamazoo River OU
Kathy Huibregtse	Principal-In-Charge	RMT, Inc.	262.879.1212	kathy.huibregtse@rmtinc.com	Senior Consultant - QA Manager

QAPP Worksheet #9-2 (*continued*)
Project Scoping Session Participants Sheet (June 6, 2007)

NAME	TITLE	AFFILIATION	TELEPHONE NUMBER	E-MAIL ADDRESS	PROJECT ROLE
Jim Hutchens (by Telephone)	Senior Project Manager	RMT, Inc.	262.879.1212	james.hutchens@rmtinc.com	RMT Project Manager for emergency actions in the former powerhouse discharge channel
Nathan Weber (By Telephone)	Project Engineer	RMT, Inc.	262.879.1212	Nathan.weber@rmtinc.com	Sampling Program Coordinator for emergency response actions in the former powerhouse discharge channel

Comments/Decisions:

- Discussed new project organization on remedial activities: Michael Berkoff – Landfills/Sam Chummar – Mills/ Jim Saric – River and oversight for all OUs. Communication distribution is to include all project managers, Sam Borries, and the MDEQ.
- Geotechnical information was reviewed to provide needed information to assess slope stability for the emergency action and additional insight to the U.S. EPA regarding impacts of tree removal on adjoining MDNR property. Overall, there are less soft paper residuals in the areas closest to the river, but soft material requires an adjustment to a 5:1 slope along the river face.
- Presented overall approach to the removal and relocation of former powerhouse discharge channel residuals to the top of the landfill, the regrading of the landfill slope, installation of 500-year flood erosion protection, installation at a hydraulic barrier through a clay plug, and the general configuration of the former powerhouse discharge channel activities and how they are integrated into the final RD/RA.
- Discussed and agreed to the option of a multi-area QAPP (desired) and the timeline for QAPP submittal.
- Discussed and agreed to intermediate submittals of portions of the design report since the schedule does not accommodate extended review in late July.
- Noted Weyerhaeuser's ongoing dialogue for ownership of the 12th Street Landfill property.

Action Items:

- Continue to prepare Quality Assurance Project Plan (QAPP) for target submittal date of June 21, 2007 - Weyerhaeuser
- Provide final bathymetry and visual sediment assessment scope document for the U.S. EPA's review by close-of-business June 6, 2007 - Weyerhaeuser
- Review and approve bathymetry and visual sediment assessment scope document by Friday, June 8, 2007 - U.S. EPA
- Continue to obtain engineering data and prepare design report - Weyerhaeuser

Consensus Decisions:

- Multi-Area QAPP is preferred in new format.
- Design report will be sent in sections for input or the schedule cannot be achieved.

QAPP Worksheet #9-3
Project Scoping Session Participants Sheet (December 7, 2007)

Project Name: 12th Street Landfill (Operable Unit No. 4) RD/RA

Projected Date(s) of Sampling: 2008 **Site Name:** Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

RMT Project Managers: Linda Hicken **Location of Scoping Session:** U.S. EPA Region 5, Chicago, Illinois

Date of Session: December 7, 2007

Scoping Session Purpose: To kick off the Remedial Design project

NAME	TITLE	AFFILIATION	TELEPHONE NUMBER	E-MAIL ADDRESS	PROJECT ROLE
Eileen Furey	Associate Regional Counsel	U.S. EPA, Region 5	312.886.7950	furey.eileen@epa.gov	Counsel for U.S. EPA
Michael Berkoff	Remedial Project Manager	U.S. EPA, Region 5	312.353.8983	berkoff.michael@epa.gov	Project Manager for 12th Street Landfill
Paul Bucholtz (by telephone)	Superfund Section - Specialized Sampling Unit - Project Manager	MDEQ	517.373.8174	bucholtp@michigan.gov	MDEQ Project Manager
Jennifer Hale	Environmental Manager	Weyerhaeuser Company	253.924.3746	jennifer.hale@weyerhaeuser.com	Project Coordinator for Weyerhaeuser
Joe Jackowski (by telephone)	Senior Legal Counsel	Weyerhaeuser Company	253.924.3461	joe.jackowski@weyerhaeuser.com	Counsel for Weyerhaeuser
Mark Schneider (by telephone)	Attorney at Law	Perkins Coie	206.359.8627	mwschneider@perkinscoie.com	Outside Counsel for Weyerhaeuser
Jeff Keiser	Project Manager	CH2M Hill	414.847.0382	jeff.keiser@ch2m.com	Oversight Contractor to the U.S. EPA
Linda Hicken	Senior Project Manager	RMT, Inc.	608.662.5307	linda.hicken@rmtinc.com	Project Manager for 12th Street Landfill RD/RA

QAPP Worksheet #9-3 (*continued*)
Project Scoping Session Participants Sheet (December 7, 2007)

NAME	TITLE	AFFILIATION	TELEPHONE NUMBER	E-MAIL ADDRESS	PROJECT ROLE
Jim Hutchens	Senior Project Manager	RMT, Inc.	262.879.1212	james.hutchens@rmtinc.com	Project Manager for Emergency Actions in the former powerhouse channel
Kathy Huibregtse	Vice President	RMT, Inc.	262.879.1212	kathy.huibregtse@rmtinc.com	Principal-In-Charge - QA Manager

QAPP Worksheet #9-3 (*continued*)
Project Scoping Session Participants Sheet (December 7, 2007)

Comments/Decisions:

- The meeting participants discussed lessons learned from the Emergency Action in the former powerhouse channel in 2007.
- The deadlines the 12th Street Landfill RD/RA have not been triggered. In the context of compliance with the SOW, the RD process was initiated with the submittal of the design of the erosion control measures along the eastern slope of the landfill as part of the Emergency Action in 2007. Weyerhaeuser recommended that the timeline for development of the RD Workplan be started on January 7, 2008.
- Weyerhaeuser summarized which components of the remedy were completed as part of the Emergency Action and which are to be completed as part of the Remedial Action. The U.S. EPA concurred.
- The potential need for a leachate collection system can be evaluated using existing information. Collection of additional field data is not anticipated.
- A gas extraction system will likely be installed with the landfill cover system. Limited field data may be collected as part of the predesign investigation.
- A schedule for accelerating the RD process should be presented in the RD Workplan.
- Weyerhaeuser presented a conceptual plan for an eco-park as a potential alternative approach for long-term site closure. The U.S. EPA advised engaging the natural resource trustees early on the idea.
- The findings pertaining to the 12th Street Landfill that were contained in the first 5-Year Review Report for the entire Kalamazoo River Superfund site were constrained by the options for evaluating the protectiveness of a remedy under the Superfund program. As necessary, the U.S. EPA will clarify for the public any potential misperceptions regarding the protectiveness of the remedy.
- The U.S. EPA is planning to host a site-wide discussion of the appropriate period of time in which wetland/floodplain areas may be inundated for purposes of determining clean up criteria for ecological receptors.

Action Items:

- Weyerhaeuser to provide more frequent updates to the U.S. EPA during periods of high activity in the field (e.g., daily e-mails as appropriate).
- As applicable, Weyerhaeuser to discuss options for field modifications with U.S. EPA's field representative.
- Weyerhaeuser to send a letter to the U.S. EPA, for inclusion in the Administrative Record, clarifying certain statements and conclusions in the first 5-Year Review Report.
- U.S. EPA to determine the appropriate mechanism for correcting the inaccurate statement in the first 5-Year Review Report that Weyerhaeuser needs to install a fence around the landfill by December 2007.
- U.S. EPA to provide a list of information needed to facilitate future decision making.
- U.S. EPA/MDEQ to obtain for Weyerhaeuser workplans/reports related to the management of landfill gas at the operable units.
- A meeting to discuss the preliminary scope of the predesign studies will be scheduled in early January 2008.

Consensus Decisions:

- A fence around the landfill is not required by December 2007, as stated in the first 5-Year Review Report. As required in the ROD, a perimeter fence is required as part of the RA.

QAPP Worksheet #9-4
Project Scoping Session Participants Sheet (January 9, 2008)

Project Name: 12th Street Landfill (Operable Unit No. 4) RD/RA

Projected Date(s) of Sampling: 2008 **Site Name:** Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

RMT Project Managers: Linda Hicken **Location of Scoping Session:** Conference Call

Date of Session: January 9, 2008

Scoping Session Purpose: To discuss the scope of the predesign studies

NAME	TITLE	AFFILIATION	TELEPHONE NUMBER	E-MAIL ADDRESS	PROJECT ROLE
Michael Berkoff	Remedial Project Manager	U.S. EPA, Region 5	312.353.8983	berkoff.michael@epa.gov	Project Manager for 12th Street Landfill
Paul Bucholtz	Superfund Section - Specialized Sampling Unit - Project Manager	MDEQ	517.373.8174	bucholtp@michigan.gov	MDEQ Project Manager
Jennifer Hale	Environmental Manager	Weyerhaeuser Company	253.924.3746	jennifer.hale@weyerhaeuser.com	Project Coordinator for Weyerhaeuser
Jeff Keiser	Project Manager	CH2M Hill	414.847.0382	jeff.keiser@ch2m.com	Oversight Contractor to the U.S. EPA
Linda Hicken	Senior Project Manager	RMT, Inc.	608.662.5307	linda.hicken@rmtinc.com	Project Manager for 12th Street Landfill RD/RA
Mike Amstadt	Senior Design Engineer	RMT, Inc.	608.662.5271	mike.amstadt@rmtinc.com	Design QA
Eric Watruba	Design Engineer	RMT, Inc.	608.662.5226	eric.watruba@rmtinc.com	Lead engineer
Kathy Huibregtse	Vice President	RMT, Inc.	262.879.1212	kathy.huibregtse@rmtinc.com	Principal-In-Charge - QA Manager

QAPP Worksheet #9-4 (*continued*)
Project Scoping Session Participants Sheet (December 7, 2007)

Comments/Decisions:

- The timeline for development of the RD Workplan started on January 7, 2008. Although the Consent Decree allows 60 days for submittal of the RD Workplan, in order to expedite the RD process, Weyerhaeuser plans to submit the RD Worklplan on February 21, 2008.
- Weyerhaeuser presented a summary of the existing information collected during historical investigations at OU-4, and described the additional information to be collected to support the grading plan, to assess the extent of visible residuals in certain areas (the woodlands and quarry property), and to assess constructability in the wetland.
- The potential need for a leachate collection system will be evaluated using existing information. No additional field data is needed.
- A passive gas collection system will be installed with the landfill cover system. Limited field data may be collected as part of the predesign investigation.
- A schedule for streamlining the RD deliverables and schedule will be presented in the RD Workplan.
- As applicable, Weyerhaeuser will identify potential scenarios under which field modifications (e.g., additional test pits or change in methods) may be needed.

Action Items:

- Weyerhaeuser plans to submit the RD Worklplan on February 21, 2008.
- Weyerhaeuser will submit a Freedom of Information Act request to the MDEQ to facilitate its previous request for workplans/reports related to the management of landfill gas at the operable units.

Consensus Decisions:

- The Health and Safety Plan for the predesign field investigations will be submitted as part of the RD Workplan.

QAPP Worksheet #10-1
Problem Definition - DQOs
(Emergency Response Activities in the Former Powerhouse Discharge Channel)

Step 1: State the problem.

In 2001, the United States Environmental Protection Agency (U.S. EPA) issued a Record of Decision (ROD) for the 6.5-acre 12th Street Landfill located in Otsego Township within Allegan County. The 2001 ROD consisted of 11 major components, including relocation of residuals present in the former powerhouse discharge channel to the landfill and construction of an erosion control system protective of a 500-year flood event. In February 2007, the U.S. EPA authorized a Time-Critical Removal Action (TCRA) to remove PCB-contaminated sediment in the former Plainwell Impoundment (a section of Operable Unit #5 of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site). As part of the TCRA, the earthen section of the Plainwell Dam will be removed and the Kalamazoo River will be rerouted through the former powerhouse discharge channel. The 12th Street Landfill abuts the river and is located directly downstream of the earthen section of the Plainwell Dam.

Rerouting of the Kalamazoo River will impact paper residuals currently present in the channel and will create different erosion and flood conditions along the 12th Street Landfill riverbank. Weyerhaeuser Company (Weyerhaeuser) is planning to address these issues under Section XVII (Emergency Response), paragraph 67, of Weyerhaeuser's 2005 Consent Decree with the U.S. EPA. The emergency response activities will include removing residuals that are contiguous with the 12th Street Landfill, regrading the landfill slope adjoining the river, and constructing an erosion protection system consistent with the requirements of the ROD. Data collection activities during the emergency removal action will include surface water quality monitoring and effluent monitoring of treated dewatering fluids collected from the sediment containment area.

Various investigative activities have identified paper residuals along the bank of the 12th Street Landfill and within the former powerhouse discharge channel contiguous to the landfill. Additional data will be collected to assess residual PCB concentrations after remedial measures are completed.

Step 2: Identify the goal of the study.

The key goals of the post-removal action monitoring are as follows:

- Confirmation of the removal of visual wastewater residuals in the former powerhouse discharge channel that were contiguous with the 12th Street Landfill
- Documentation of post-removal topography along the Kalamazoo River

The key goals of monitoring during construction operations are as follows:

- Documentation of surface water quality during emergency actions
- Protection of water quality by application of a real-time in-field measurement of turbidity as an action level
- Protection of water quality by collection of confirmatory effluent samples from dewatering treatment operations

Step 3: Identify information inputs.

- Decision inputs for removal incorporate both the concentration and the distribution of PCBs in site media. Data to be collected to meet the goals of the removal action include a sufficient number of data points of acceptable quality to support any decisions.
- Decision input for water treatment is the comparison of upstream and downstream turbidity with an action level of 2 times the upstream turbidity.

QAPP Worksheet #10-1 (*continued*)
Problem Definition - DQOs
(Emergency Response Activities in the Former Powerhouse Discharge Channel)

Step 4: Define the boundaries of the sampling.

- The area considered as part of this action includes the 12th Street Landfill and the former powerhouse discharge channel located in Otsego Township, Allegan County (See Figure 1-1).

Step 5: Develop the analytical approach.

- Confirmation samples for PCBs in sediment will be analyzed on a quick-turn basis. Data will be used to adjust removal activities in the field as appropriate. The final decision on removal effectiveness will be based on validated confirmation results.
- Confirmation water quality samples will be tested for PCBs, phosphorus, and TSS using standard turnaround times. Data will be compared with turbidity samples to confirm or adjust action levels.

Step 6: Specify performance or acceptance criteria.

Visual observations and post-excavation sediment samples in the area(s) where residuals were removed will be used to confirm the horizontal and vertical extent of the excavation and the effectiveness of the removal action, as well as to determine whether additional sediment will be removed. Additional sampling will be performed if additional sediment is removed.

Step 7: Develop the plan for obtaining the data.

The overall QA objective is to develop and implement procedures for field sampling that will provide results to support the evaluation of site data consistent with NCP requirements. In general, spatially distributed grid sampling will be performed to provide representative distribution and an adequate number of samples The size of the grids and the number of sampling locations will depend upon the areal extent of sediment removal. Specific procedures for sampling, chain-of-custody, instrument calibration, analysis, reporting, and internal quality control are described in other worksheets of this QAPP.

QAPP Worksheet #10-2
Problem Definition - DQOs
(Emergency Response Activities on the Plainwell Mill Banks)

Step 1: State the problem.
In February 2007, the U.S. EPA authorized a Time-Critical Removal Action (TCRA) to remove PCB-contaminated sediment in the former Plainwell Impoundment (a section of Operable Unit 05 of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site). As part of the TCRA, the earthen section of the Plainwell Dam will be removed and the Kalamazoo River will be rerouted through the former powerhouse discharge channel. Rerouting of the Kalamazoo River will impact paper residuals currently present in the channel and will create different erosion and flood conditions along the Plainwell Mill banks. Various investigative activities have identified paper residuals along the bank of the Plainwell Mill. The actions being taken for the Plainwell Impoundment TCRA could cause a release of hazardous substances from the Plainwell Mill banks, so the U.S. EPA has authorized Weyerhaeuser to address the issue and thus prevent abate or minimize a release or potential release. Work will include excavating or containing paper residuals that are present in the floodplain and bank areas near the river along the former Plainwell Mill, reshaping of banks in those locations, and possible construction of erosion controls to minimize bank undercutting. These bank areas are part of the Kalamazoo River Operable Unit. Specific emergency response work to be performed by Weyerhaeuser in addressing the threatened release will be designed and performed in a manner that considers the implications of the City of Plainwell future land use concepts and is generally consistent with applicable provisions of the Settlement Agreement and the Former Plainwell Impoundment Time-Critical Removal Action Design Report. Data collection activities during the emergency action will include surface water quality monitoring and effluent monitoring of treated dewatering fluids collected from the sediment containment area. Additional data will be collected to assess residual PCB concentrations after remedial measures are completed.
Step 2: Identify the goal of the study.
The key goals of the post Emergency Action monitoring are as follows: ▪ Confirmation of the removal of visual wastewater residuals on and immediately adjacent to the Plainwell Mill banks. ▪ Documentation of post Emergency topography along the Kalamazoo River. The key goals of monitoring during construction operations are as follows: ▪ Documentation of surface water quality during emergency actions. ▪ Protection of water quality by application of a real-time in-field measurement of turbidity as an action level. ▪ Protection of water quality by collection of confirmatory effluent samples from dewatering treatment operations.
Step 3: Identify information inputs.
▪ Decision inputs for excavation incorporate both the concentration and the distribution of PCBs and the associated visual presence of paper residuals in floodplain soils, near shore sediments and limited bank soil. Data to be collected to meet the goals of the Emergency Action include a sufficient number of data points of acceptable quality to support any decisions. ▪ Decision input for water treatment is the comparison of upstream and downstream turbidity with an action level of 2 times the upstream turbidity.
Step 4: Define the boundaries of the sampling.
▪ The area considered as part of this action includes the Plainwell Mill Banks located in Gun Plain Township, Allegan County (see Figure 1-1).

QAPP Worksheet #10-2 (*continued*)
Problem Definition - DQOs
(Emergency Response Activities on the Plainwell Mill Banks)

Step 6: Specify performance or acceptance criteria.
Visual observations and post-excavation bank soil, floodplain soil and sediment samples in the area(s) where residuals were removed will be used to confirm the horizontal and vertical extent of the excavation and the effectiveness of the removal action, as well as to determine whether additional soil and sediment will be removed. Additional sampling will be performed if additional soil and sediment is removed.
Step 7: Develop the plan for obtaining the data.
The overall QA objective is to develop and implement procedures for field sampling that will provide results to support the evaluation of site data consistent with NCP requirements. In general, spatially distributed grid sampling will be performed to provide representative distribution and an adequate number of samples The size of the grids and the number of sampling locations will depend upon the aerial extent of banks soil, floodplain soil and sediment removal. Specific procedures for sampling, chain-of-custody, instrument calibration, analysis, reporting, and internal quality control are described in other worksheets of this QAPP.

QAPP Worksheet #10-3
Problem Definition - DQOs
(Predesign Investigations for the Remedial Design for the 12th Street Landfill)

Step 1: State the problem.

Operable Unit #4 (OU-4) of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Kalamazoo River Superfund Site) consists of the former 12th Street Landfill and the four areas outside the landfill where PCB-contaminated residual material has been observed. The 6.5 acre landfill is situated on an approximately 24-acre property with about 17 acres of wetlands. The additional portions of OU-4 that are located outside the landfill property include the woodland area owned by the State of Michigan (State) under the management of the Michigan Department of Natural Resources (MDNR), the gravel operation adjacent to the landfill, and the former powerhouse discharge channel. Contamination in the former powerhouse discharge channel was addressed as part of Emergency Actions implemented in 2007.

Paper residuals from the former Plainwell Mill (mill), located in Plainwell, Michigan, were disposed in the 12th Street Landfill during the period from approximately 1955 to 1981. The landfill reportedly also accepted solid waste from the mill during part of its period of active operation. A number of investigations have been performed at the site. The investigations have confirmed the nature of the material in the landfill and have shown that paper residuals are present in certain areas outside of the landfill (i.e., in the wetlands to the north/northwest, the quarry property, and the State property). Some of the residuals/native soil beyond the toe of the landfill (i.e., outside the footprint of the landfill) may contain PCBs at concentrations exceeding State of Michigan or Kalamazoo River Superfund Site-specific ecological risk-based criteria.

A Record of Decision (ROD) for OU-4 was issued on September 28, 2001. In general, the components of the selected remedy include (1) the excavation and relocation of residuals potentially containing PCBs in the wetland, woodland, quarry property, and former powerhouse discharge channel into the landfill; (2) the excavation and relocation of the eastern slope of the landfill along the river sufficient to create a buffer zone that will prevent hydraulic connection between the fill material and the river; (3) the installation of an engineered cover pursuant to state requirements for a solid waste landfill (Part 115); (4) the installation of a sidewall containment system; (5) the evaluation of the need for a gas venting system within the final cover system; (6) the evaluation of the need for a leachate collection system; (7) short-term and long-term monitoring; (8) fencing, warning signs, deed restrictions, and noise and dust control; and (9) long-term maintenance and post-closure care.

In January 2005, Weyerhaeuser Company (Weyerhaeuser) negotiated a Consent Decree (CD) with the U.S. EPA (Civil Action No. 1:05-CV0003) that established the Remedial Design (RD) and Remedial Action (RA) activities for the 12th Street Landfill. This revision of the Multi-Area Quality Assurance Project Plan (QAPP) has been prepared in fulfillment of the requirements for an RD Workplan for the 12th Street Landfill that are contained in the CD and the Statement of Work (SOW).

The RD Workplan for the 12th Street Landfill includes a number of predesign investigations, some of which will involve field data collection and visual observations. Field data collection activities will include visual information obtained by the advancement of test pits, visual information obtained by the advancement of Geoprobe® borings, and gas concentration measurements (methane, carbon dioxide, and oxygen) in existing monitoring wells and in the Geoprobe® borings advanced as part of the predesign investigation.

The field investigations will involve (1) a determination of the extent of visible paper residuals beyond the landfill footprint, (2) the collection of data to support the grading design for the final landfill cover, and (3) the collection of data for use in the design of a landfill gas venting system. Sufficient information is available from previous investigations to evaluate the potential need for a leachate collection system. No additional field information is needed to support this objective.

QAPP Worksheet #10-3 (*continued*)
Problem Definition - DQOs
(Predesign Investigations for the Remedial Design for the 12th Street Landfill)

Step 2: Identify the goal of the study.

The key goals of the data collection activities for the predesign investigations are as follows:

Extent of Paper Residuals Beyond Landfill Footprint

Wetland

- To confirm the approximate areal extent of visible paper residuals beyond the toe of the landfill as delineated based on the results from previous investigations.
- To assess the degree of difficulty in distinguishing the visible paper residuals from the native soil.
- To evaluate potential constructibility issues associated with working in the wetland north of the landfill.

Quarry/State Properties

- To delineate the areal extent and to better estimate the depth of visible paper residuals on the quarry property to the southwest and on the State property to the southeast, in order to support discussions with owners of these adjacent properties concerning access for conducting the remedial actions on the properties required by the ROD.

Grading Design

- To better estimate the depth of the paper residuals along the property boundaries with 12th Street, the quarry to the southwest, and with the State property to the southeast, in order to reduce uncertainties in designing the final landfill grades.

Landfill Gas Management

- To collect readily accessible information about the subsurface landfill gas conditions at the 12th Street Landfill that may be useful in designing a passive gas venting system for the landfill.

QAPP Worksheet #10-3 (*continued*)
Problem Definition - DQOs
(Predesign Investigations for the Remedial Design for the 12th Street Landfill)

Step 3: Identify information inputs.
Extent of Paper Residuals Beyond Landfill Footprint ***Wetland*** ▪ Evaluating constructibility issues – Information inputs will include visual observations of the depth to groundwater in the wetland and any related complications that are encountered during excavation of the near-surface soil. ▪ Confirming areal extent and distinguishing the visible paper residuals from the native soil – Information inputs will include visual observations of paper residuals being present in the soil beyond the toe of the landfill. ***Quarry/State Properties*** ▪ Delineating areal extent and better estimating the depth of visible paper residuals – Information inputs will include visual observations of paper residuals being present in the soil on these properties. ***Grading Design*** ▪ Better estimating the depth of the paper residuals along the property boundaries with 12th Street, the quarry to the southwest, and with the State property to the southeast - Information inputs will include visual observations of paper residuals being present in these areas and classification of the materials encountered based on the procedures outlined in ASTM D2488 (i.e., soil types). ***Landfill Gas Management*** ▪ Evaluating subsurface landfill gas concentrations– Information inputs will include measurements of concentrations of methane, carbon dioxide, and oxygen in the vadose zone at the site. The information that is collected for determining the extent of paper residuals beyond the landfill footprint and for the grading design will be supplemented with similar visual information recorded during previous investigations at the 12th Street Landfill site (see Worksheet #13-1). No soil gas measurements have been collected to-date.
Step 4: Define the boundaries of the sampling.
▪ The area considered as part of this action includes the 12th Street Landfill property, and adjacent quarry and State properties, located in Otsego Township, Allegan County (see Figure 1-1).
Step 5: Develop the analytical approach.
▪ No samples will be collected for laboratory analytical testing. Gas sampling will be performed on-site using a portable combustible gas meter.

QAPP Worksheet #10-3 (*continued*)
Problem Definition - DQOs
(Predesign Investigations for the Remedial Design for the 12th Street Landfill)

Step 6: Specify performance or acceptance criteria.

The acceptance criteria for the predesign data collection activities are having collected sufficient information to meet the study objectives described under Step 2 above and sufficient information to proceed with the Remedial Design. If these criteria are not met, additional data will be collected in a similar manner to meet these objectives.

Step 7: Develop the plan for obtaining the data.

Extent of Paper Residuals Beyond Landfill Footprint

Wetland

- Evaluating constructibility issues and confirming areal extent and distinguishing the visible paper residuals from the native soil – Advance approximately 3 test pits

Quarry/State Properties

- Delineating areal extent and better estimating the depth of visible paper residuals – Advance approximately 3 test pits within the quarry property and approximately 4 test pits within the State property

Note: In the event that in-field conditions limit the use of test pit excavating equipment (e.g., a backhoe), other tools, such as hand augers or shovels, may be used instead.

Grading Design

- Better estimating the depth of the paper residuals along the property boundaries with 12th Street, the quarry to the southwest, and with the State property to the southeast – Advance approximately nine Geoprobe® borings into the 12th Street Landfill at select locations where fill material is believed to extend beyond the property boundary to the southwest and to the southeast.
- Advance a minimum of two soil borings (RDB-10 and RDB-11) near the southern end of the landfill, as shown on Figure 2-3, to confirm the thickness of the fill in this area. Advance the borings approximately 5 feet into the native soil underlying the fill or to refusal. The locations of these borings may be adjusted in the field as necessary to avoid underground or aboveground utility lines. Additional borings may be installed to the north of the initial borings as may be deemed useful by Weyerhaeuser, in consultation with oversight agencies as needed, for purposes of designing the landfill cover (e.g., if fill material is not encountered at a location where existing data that indicate fill is present).

Landfill Gas Management

- Evaluating subsurface landfill gas concentrations – As readily accessible, measure gas concentrations (methane, oxygen, and carbon dioxide) and pressures (vacuum) at the existing groundwater monitoring wells screened in the vadose zone (MW-6A, MW-7A, and MW-8A). In addition, measure gas concentrations at each Geoprobe® boring used to better estimate the depth of the paper residuals along the property boundaries to the southwest and to the southeast. Pressures that may have developed within the groundwater monitoring wells caused by excess landfill gas (if present) will also be measured. A passive gas venting system can be designed without the above information. If these data cannot be readily obtained, additional efforts will not be employed to collect the information.

QAPP Worksheet #11-1
Project Quality Objectives/Systematic Planning Process Statements
(Emergency Response Activities in the Former Powerhouse Discharge Channel)

Who will use the data?

Weyerhaeuser, Inc.; RMT Inc.; and the overseeing agencies (the United States Environmental Protection Agency [U.S. EPA] and the Michigan Department of Environmental Quality [MDEQ]) will use the data.

What will the data be used for?

Surface Water Quality Monitoring:

The water quality monitoring data will be used to assess compliance with Applicable Relevant and Appropriate Requirements (ARARs) and to ensure that river water quality is not negatively impacted by the remedial actions in the former powerhouse discharge channel.

Sediment Sampling:

Sediment sampling data will be used to document the removal of residuals from the former powerhouse discharge channel that are contiguous with the 12^{th} Street Landfill, including the effectiveness of the removal action and the presence of residual concentrations in the sediment.

Water Treatment System Monitoring:

The water treatment system monitoring data will be used to assess compliance with the discharge limits and other ARARs, and to ensure proper operation of the treatment system.

What types of data are needed (target analytes, analytical groups, field-screening, on-site analytical or off-site laboratory techniques, sampling techniques)?

Sampling and analytical protocols are defined later in this document.

Surface Water Quality Monitoring:

Water quality will be assessed by monitoring for turbidity and total PCBs. Turbidity samples will be taken to provide data instantaneously. Water samples will be submitted and sent to an off-site laboratory for total PCB analysis using EPA Method 608.

Sediment Sampling:

Field-screening will rely on the presence of visible residuals. Confirmatory sediment sampling will be assessed by sampling for total PCBs using off-site analytical testing.

Water Treatment Monitoring:

Data collected for the water treatment system will include total PCBs, total suspended solids (TSS), and total phosphorus as P. Total PCBs will be analyzed using EPA Method 608, TSS will be analyzed using EPA Method 160.2, and phosphorus will be analyzed using EPA Method 365.3. All samples will be analyzed by an off-site laboratory.

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QAPP Worksheet #11-1 (*continued*)
Project Quality Objectives/Systematic Planning Process Statements
(Emergency Response Activities in the Former Powerhouse Discharge Channel)

How "good" do the data need to be in order to support the environmental decision?

Turbidity data must be collected with a meter that has a precision of at least + 1 nephelometric turbidity units (NTUs); all data should be collected with a similar meter, calibrated per the manufacturer's requirements.

PCB, TSS, and phosphorus data will be collected and analyzed in accordance with the performance standards of EPA Methods 608, 160.2, and 365.3, respectively.

Verifiable data are necessary to determine the need for additional sediment removal.

How much data are needed (number of samples for each analytical group, matrix, and concentration)?

How much data are needed will be determined based on the construction period and the extent of excavation.

QAPP Worksheet #11-1 (*continued*)
Project Quality Objectives/Systematic Planning Process Statements
(Emergency Response Activities in the Former Powerhouse Discharge Channel)

Where, when, and how should the data be collected/generated?

__Surface Water Quality Monitoring:__

- Turbidity will be taken prior to and following equipment placement in the work area; at the beginning of the work day, approximately hourly while work is performed; and at the end of the work day. The upstream turbidity samples will be taken at a location near the Plainwell spillway and then at two downstream locations approximately 200 feet and 300 feet downstream of the work area along the path of the water flowing past the work area. The samples will be collected from either a boat or a shore-mounted semipermanent pier. The compliance point is the sample located 300 feet downstream of the work area. The sample collected at 200 feet downstream will serve as a warning to address site actions if elevated results are measured.
- Turbidity of the water discharged to the river during dewatering will be monitored hourly at the pump discharge when dewatering operations are under way.
- River water grab samples will be taken for PCB analysis weekly while work is performed from one location upstream and two locations downstream of the work area (same as the aforementioned upstream and 200 and 300 feet downstream locations for turbidity).

__Sediment Sampling:__

- Samples will be collected as soon as practicable after completion of the former powerhouse discharge channel removal action.
- The channel area will be split into approximately 20 grids per 8,000-square foot area (*i.e.*, approximately 400 square feet per grid). Five grids will be selected from the approximately 20 grids in a semi-random fashion in order to ensure adequate coverage, and one sample will be collected from each selected grid (*i.e.*, a total of approximately five sediment samples per 8,000-square foot area).
- Specific sampling methods will depend upon the depth of the overlying water. If limited water is present, samples will be collected (*e.g.*, using a trowel) by targeting a sediment depth of 0-6 inches. If greater water depths are present, sediment samples will be collected with a Ponar-type grab sampler, a core sampler, or an alternative method suitable to the sediment conditions.

__Water Treatment System Monitoring:__

- Grab samples for PCB analysis will be taken twice per week from the effluent of the water treatment system.
- Grab samples for TSS will be taken twice per week from the effluent of the water treatment system.
- Grab samples for phosphorus will be taken twice per week from the effluent of the water treatment system.

Who will collect and generate the data?

RMT will collect the samples; the laboratory (WATS) will analyze the samples and issue data reports; and RMT will validate the data.

QAPP Worksheet #11-1 (*continued*)
Project Quality Objectives/Systematic Planning Process Statements
(Emergency Response Activities in the Former Powerhouse Discharge Channel)

How will the data be reported?

All data from surface water quality monitoring will be available immediately for alteration of field activities if results indicate unacceptable increases in turbidity. All turbidity results will be compiled and presented in the emergency action documentation report. Sediment sampling data will be reported as soon as available to confirm completion of the excavation, and validated data will be presented in the final summary report. Water treatment system monitoring data will be used as soon as they are available to verify that the treatment system is adequate and operating correctly, and validated data will be presented in the final summary report.

How will the data be archived?

Validated data will be archived in an appropriate database to ensure that information is readily available, searchable, and compatible with a GIS system.

QAPP Worksheet #11-2
Project Quality Objectives/Systematic Planning Process Statements
(Emergency Response Activities on the Plainwell Mill Banks)

Who will use the data?

Weyerhaeuser, RMT, and the overseeing agencies (U.S. EPA and the Michigan Department of Environmental Quality [MDEQ]) will use the data.

What will the data be used for?

Surface Water Quality Monitoring:

The water quality monitoring data will be used to assess compliance with Applicable Relevant and Appropriate Requirements (ARARs) and to ensure that river water quality is not negatively impacted by the remedial actions on the Plainwell Mill banks.

Soil and Sediment Sampling:

Soil and sediment sampling data will be used to document the excavation of residuals from the Plainwell Mill banks, including the effectiveness of the emergency action and the presence of residual concentrations in the soil and sediment.

Water Treatment System Monitoring:

The water treatment system monitoring data will be used to assess compliance with the discharge limits and other ARARs, and to ensure proper operation of the treatment system.

What types of data are needed (target analytes, analytical groups, field-screening, on-site analytical or off-site laboratory techniques, sampling techniques)?

Sampling and analytical protocols are defined later in this document.

Surface Water Quality Monitoring:

Water quality will be assessed by monitoring for turbidity and total PCBs. Turbidity samples will be taken to provide data instantaneously. Water samples will be submitted and sent to an off-site laboratory for total PCB analysis using EPA Method 608.

Soil and Sediment Sampling:

Field-screening will rely on the presence of visible residuals. Confirmatory soil and sediment sampling will be assessed by sampling for total PCBs using off-site analytical testing.

Water Treatment Monitoring:

Data collected for the water treatment system will include total PCBs, total suspended solids (TSS), and total phosphorus as P. Total PCBs will be analyzed using EPA Method 608, TSS will be analyzed using EPA Method 160.2, and phosphorus will be analyzed using EPA Method 365.3. All samples will be analyzed by an off-site laboratory.

QAPP Worksheet #11-2 (*continued*)
Project Quality Objectives/Systematic Planning Process Statements
Emergency Response Activities on the Plainwell Mill Banks

How "good" do the data need to be in order to support the environmental decision?
Turbidity data must be collected with a meter that has a precision of at least + 1 nephelometric turbidity units (NTUs); all data should be collected with a similar meter, calibrated per the manufacturer's requirements.
PCB, TSS, and phosphorus data will be collected and analyzed in accordance with the performance standards of EPA Methods 608, 160.2, and 365.3, respectively.
Verifiable data are necessary to determine the need for additional soil and sediment excavation .
How much data are needed (number of samples for each analytical group, matrix, and concentration)?
How much data are needed will be determined based on the construction period and the extent of excavation.

QAPP Worksheet #11-3
Project Quality Objectives/Systematic Planning Process Statements
(Predesign Investigations for the Remedial Design for the 12th Street Landfill)

Who will use the data?

Weyerhaeuser, RMT, and the overseeing agencies (U.S. EPA and the Michigan Department of Environmental Quality [MDEQ]) will use the data.

What will the data be used for?

The data will be used for the design of certain components of the remedies required in the Record of Decision (ROD) for the 12th Street Landfill site, including: (1) the excavation and relocation of residuals into the landfill, (2) the installation of an engineered cover, and (3) the installation of a sidewall containment system. Specifically, the predesign investigation data, which is collected by the installation of test pits and Geoprobe® borings, will be used to confirm the extent of paper residuals beyond the landfill footprint and for the site grading design. In addition, subsurface landfill gas concentration data will be obtained for use in the design of a passive gas venting system.

What types of data are needed (target analytes, analytical groups, field-screening, on-site analytical or off-site laboratory techniques, sampling techniques)?

Extent of Paper Residuals Beyond Landfill Footprint – On-site visual observations obtained by the installation of test pits

Grading Design – On-site visual observations obtained by the installation of Geoprobe® borings and the classification of soil types according to ASTM D2488

Landfill Gas Management – On-site field measurements of methane, carbon dioxide, and oxygen in the vadose zone at the site, using a portable combustible gas meter, and pressure, using a pressure gauge.

How "good" do the data need to be in order to support the environmental decision?

In order to meet the objectives of the pre-design investigations, the data collection activities must achieve the following:

Extent of Paper Residuals Beyond Landfill Footprint – To determine the thickness of the paper residuals in select locations, test pits must be excavated to a depth sufficient to reach the native soil underlying the paper residuals. In order to meet the investigative objectives, additional tests pits may be added to the proposed scope (i.e., either closer to or farther from the toe of the landfill), if necessary. In the event that in-field conditions limit the use of test pit excavating equipment (e.g., a backhoe), other tools, such as hand augers or shovels, may be used instead.

Grading Design – To determine the thickness of the paper residuals, Geoprobe® borings must be installed to a depth sufficient to reach the native soil underlying the paper residuals.

Landfill Gas Management – A passive gas venting system will be incorporated into the landfill final cover regardless of the information that may be obtained from the predesign investigation. Additional information may be collected, if it is readily accessible, to supplement existing information/assumptions. To accurately determine the concentrations of methane, carbon dioxide, and oxygen in the vadose zone soil, the portable gas meter must be properly calibrated, and the readings on the gas meter must be allowed to stabilize before measurements are recorded. In addition, gas sampling ports must be properly installed on the existing monitoring wells (MW-6A, MW-7A, and MW-8A) and Post-Run Tubing (PRT) adapters must be properly installed on the landfill gas tubing that will be inserted into the Geoprobe® borings. SOP F-7 in the Field Sampling Plan provides detailed specifications for the equipment and procedures that will be used to complete these tasks.

QAPP Worksheet #11-3
Project Quality Objectives/Systematic Planning Process Statements
(Predesign Investigations for the Remedial Design for the 12th Street Landfill)

How much data are needed (number of samples for each analytical group, matrix, and concentration)?

Extent of Paper Residuals Beyond Landfill Footprint – 3 test pits in the wetlands north of the landfill, 3 test pits on the quarry property, and 4 test pits on the State property. (In the event that in-field conditions limit the use of test pit excavating equipment (e.g., a backhoe), other tools, such as hand augers or shovels, may be used instead.)

Grading Design – 9 Geoprobe® borings into the 12th Street Landfill; a minimum of 2 borings near the southern end of the landfill

Landfill Gas Management – A passive gas venting system will be incorporated into the final landfill cover regardless of the information that may be obtained from the predesign investigation. As readily accessible, gas measurements may be obtained from up to 3 existing groundwater monitoring wells screened in the vadose zone (MW-6A, MW-7A, and MW-8A) and in Geoprobe® borings installed as part of this investigation. As readily accessible, pressure will also be measured in up to 3 existing groundwater monitoring wells.

Where, when, and how should the data be collected/generated?

The data will be collected at the locations shown on Figures 2-2 and 2-3. The data collection activities are scheduled to be performed in May-June 2008, weather permitting. Sampling procedures are detailed in the Standard Operating Procedures (SOPs), which are included in the Multi-Area Field Sampling Plan, Revision 02.

Who will collect and generate the data?

RMT will collect the samples.

How will the data be reported?

Data from the predesign investigations will be presented in a section of the remedial design (RD) report or in a technical memorandum.

How will the data be archived?

Data will be archived in an appropriate database to ensure that information is readily available, searchable, and compatible with a GIS system.

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QAPP Worksheet #12-1
Measurement Performance Criteria (PCBs - Surface Water)

Matrix: Aqueous
Analytical Group: PCBs
Concentration Level: All

SAMPLING PROCEDURE[(1)]	ANALYTICAL METHOD/SOP[(2)]	DATA QUALITY INDICATORS (DQIs)	MEASUREMENT PERFORMANCE CRITERIA	QC SAMPLE AND/OR ACTIVITY USED TO ASSESS MEASUREMENT PERFORMANCE	QC SAMPLE ASSESSES ERROR FOR SAMPLING(S), ANALYTICAL(A), OR BOTH (S&A)
F-1, F-3	W-1	Precision - Overall	Relative percent difference (RPD) < 50%	Field duplicate	S&A
		Accuracy/Bias	% Recovery (%R) laboratory-generated limits[(3)]	Surrogate	A
		Accuracy/Bias Contamination	< Reporting limit (RL)	Blanks (field, equipment, method)	S&A
		Accuracy/Bias	%R laboratory-generated limits[(*)]	Laboratory control sample (LCS)	A
		Accuracy/Bias and Precision	Retention times, see analytical SOP	Retention time windows	A
		Accuracy/Bias	%R, same as LCS[(*)]	Matrix spike (MS)[(3)]	A
		Accuracy/Bias	%R, same as LCS[(*)]	Matrix spike duplicate (MSD) or laboratory control sample duplicate (LCSD)[(3)]	A
		Precision	RPD <20%	MS/MSD or LCS/LCSD[(3)]	A

Footnotes:
(1) Reference number from QAPP Worksheet #21. See the project-specific Field Sampling Plan for sampling procedures.
(2) Reference number from QAPP Worksheet #23.
(3) MS and MSD must be client-provided. LCS/LCSD performed when no MS/MSD is supplied.
(*) See Attachments 1-1 and 1-2.
RPD = relative percent difference.

QAPP Worksheet #12-2
Measurement Performance Criteria (Wet Chemistry - Surface Water)

Matrix: Water

Analytical Group: Wet chemistry

Concentration Level: All

SAMPLING PROCEDURE[1]	ANALYTICAL METHOD/SOP[2]	DATA QUALITY INDICATORS (DQIs)	MEASUREMENT PERFORMANCE CRITERIA	QC SAMPLE AND/OR ACTIVITY USED TO ASSESS MEASUREMENT PERFORMANCE	QC SAMPLE ASSESSES ERROR FOR SAMPLING(S), ANALYTICAL(A), OR BOTH (S&A)
F-3	W-2, W-3, and W-5	Precision - Overall	RPD < 50%	Field duplicate	S&A
		Accuracy/Bias Contamination	< RL	Blanks (field, equipment, calibration, preparation)	S&A
		Accuracy/Bias	%R (90-110)	Continuing calibration verification	A
		Accuracy/Bias	%R (75-125)	MS[3]	A
		Accuracy/Bias	%R (75-125)	MSD[3]	A
		Precision	%R < 20%	MS/MSD[3]	A
		Accuracy/Bias	%R laboratory-generated limit[*]	LCS	A

Footnotes:

[1] Reference number from QAPP Worksheet #21. See the project-specific Field sampling Plan for sampling procedures.

[2] Reference number from QAPP Worksheet #23.

[3] MS and MSD not applicable for TSS.

[*] See Attachment 1-1.

QAPP Worksheet #12-3
Measurement Performance Criteria (PCBs - Soil/Sediment)

Matrix: Soil/Sediment
Analytical Group:[1] PCBs
Concentration Level: All

SAMPLING PROCEDURE[2]	ANALYTICAL METHOD/SOP[3]	DATA QUALITY INDICATORS (DQIs)	MEASUREMENT PERFORMANCE CRITERIA	QC SAMPLE AND/OR ACTIVITY USED TO ASSESS MEASUREMENT PERFORMANCE	QC SAMPLE ASSESSES ERROR FOR SAMPLING(S), ANALYTICAL(A), OR BOTH (S&A)
F-4	W-4	Precision-Overall	RPD < 100%	Field duplicate	S&A
		Accuracy/Bias	%R, laboratory-generated limits[*]	Surrogate	A
		Accuracy/Bias Contamination	< RL	Blanks (field, equipment, method)	S&A
		Accuracy/Bias	%R, laboratory-generated limits[*]	LCS	A
		Accuracy/Bias and Precision	Retention times, see analytical SOP	Retention time windows	A
		Accuracy/Bias	%R, same as LCS[*]	MS[3]	A
		Accuracy/Bias	%R, same as LCS[*]	MSD or LCSD[3]	A
		Precision	%RPD <35%	MS/MSD or LCS/LCSD[3]	A

Footnotes:

(1) Reference number from QAPP Worksheet #21. See the project-specific Field Sampling Plan for sampling procedures.

(2) Reference number from QAPP Worksheet #23.

(3) MS and MSD must be client-provided. LCS/LCSD performed when no MS/MSD is supplied.

(*) See Attachments 1-1 and 1-2.

QAPP Worksheet #13-1
Secondary Data Criteria and Limitations (12th Street Landfill)

SECONDARY DATA	DATA SOURCE (originating organization, report title, and date)	DATA GENERATOR(S) (originating organization, data types, data generation/ collection dates)	HOW DATA WILL BE USED	LIMITATIONS ON DATA USE
Soil and residuals sampling data	June and Sept. 1987 and January, 1989. MDNR and Mill Staff, 24 soil and residual samples outside berm. (Discussed in G&M, 1994a).	Plainwell Paper Co.; KRSG	Remedial design	U.S. EPA approval
Electromagnetic conductivity and magnetometer survey data	G&M, 1991. "12th Street Landfill Geophysical Investigation, Plainwell, Michigan." Letter Report by Geraghty and Miller, Inc. October 11, 1991.	Plainwell Paper Co.; KRSG	Remedial design	U.S. EPA approval
Soil and residuals sampling data	G&M, 1994a. "Test Pit Investigation, Technical Memorandum, 12th Street Landfill Operable Unit, Plainwell, Michigan, Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site." Geraghty and Miller, Inc. February 18, 1994.	Plainwell Paper Co.; KRSG	Remedial design	U.S. EPA approval
Sediment probing data; soil and residuals sampling data, groundwater sampling data	G&M, 1994b. Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site Remedial Investigation/Feasibility Study, Technical Memorandum 8, 12th Street Landfill Operable Unit, Plainwell, Michigan. May 31, 1994.	Plainwell Paper Co.; KRSG	Site characterization	U.S. EPA approval(1)
Groundwater sampling data	G&M, 1996a. "Remedial Investigation Addendum I, 12th Street Landfill Operable Unit, Plainwell, Michigan, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site." March 26, 1996.	Plainwell Paper Co.; KRSG	Remedial design	U.S. EPA approval
Summary of existing data; residuals sampling data	G&M, 1996b. "Remedial Investigation Report, 12th Street Landfill Operable Unit, Plainwell Michigan, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site." Geraghty and Miller, Inc. December 20, 1996.	Plainwell Paper Co.; KRSG	Remedial design	U.S. EPA approval

QAPP Worksheet #13-1
Secondary Data Criteria and Limitations (12th Street Landfill)

SECONDARY DATA	DATA SOURCE (originating organization, report title, and date)	DATA GENERATOR(S) (originating organization, data types, data generation/ collection dates)	HOW DATA WILL BE USED	LIMITATIONS ON DATA USE
Geotechnical data	BBL, 2001a. "Geotechnical Sample Analytical Data, 12th Street Landfill Operable Unit." Transmittal Letter with Attachments. Blasland, Bouck & Lee, Inc. June 25, 2001.	KRSG	Remedial design	U.S. EPA approval
Sediment probing data	BBL, 2001b, as reported in final data summary report soil/sediment sampling results pre-design sampling. 12th Street Landfill, Operable Unit #4, Allied Paper, Inc./Portage Creek/Kalamazoo River Site, Plainwell, Michigan. July 2004.	KRSG	Site characterization	U.S. EPA approval(1)
Wetland delineation	CDM, 2002. "Michigan Department of Environmental Quality, Kalamazoo River and Portage Creek Wetland Delineation Study," Camp Dresser and McKee. January 2002.	MDEQ	Remedial design	U.S. EPA approval
Sediment probing data	U.S. EPA, 2004. Final data summary report soil/sediment sampling results pre-design sampling. 12th Street Landfill, Operable Unit #4, Allied Paper, Inc./Portage Creek/Kalamazoo River Site, Plainwell, Michigan. July 2004.	U.S. EPA	Site characterization	U.S. EPA approval(1)

Footnote:

(1) Data and observations collected during the sediment excavation will take precedence.

QAPP Worksheet #13 -2
Secondary Data Criteria and Limitations
(Plainwell Mill)

SECONDARY DATA	DATA SOURCE (originating organization, report title, and date)	DATA GENERATOR(S) (originating organization, data types, data generation/collection dates)	HOW DATA WILL BE USED	LIMITATIONS ON DATA USE
Sediment coring observations and survey results	RMT, July 2007. Visual Assessment of the Plainwell Mill Banks.	RMT July 2007	Site Characterization	U.S. EPA approval[1]
Prior investigations	CDM, 2001. Plainwell Paper Gray Seam Investigation.	CDM October 2001	Site Characterization	Data are historical and site conditions may have changed.
	BBL, 2003. PCB Data for the Plainwell Impoundment River Bank Soil Samples.	BBL October 2003		
	Weston, 2002. Removal Assessment Report for Allied Paper – Kalamazoo River Site, Otsego/Plainwell.	Weston July and August 2001		

Footnote:
(1) Data and observations collected during the sediment excavation will take precedence.

QAPP Worksheet #14
Summary of Project Tasks

SAMPLING AND ANALYSIS TASKS	
Emergency Response Activities in the Former Powerhouse Discharge Channel at the 12th Street Landfill (Operable Unit No. 4.)	
Sampling tasks:	Sampling tasks will be performed as follows: ▪ Pre-excavation bathymetry measurements and sediment sampling to plan extent of sediment excavation (*i.e.*, analytical data for polychlorinated biphenyls (PCBs), visual characterization, and engineering data) ▪ Resuspension monitoring and control, including surface water sampling and field turbidity measurements ▪ Dewatering system discharge monitoring ▪ Post-excavation confirmation sampling for PCBs in channel sediment ▪ Global positioning system (GPS)–based survey of excavation limits and sampling locations ▪ Digital photographs
Analysis tasks:	Analytical samples will be processed, prepared, and analyzed, as follows: ▪ Resuspension monitoring and control (surface water) — PCBs by WATS ▪ Dewatering system discharge monitoring (surface water) — PCBs, total suspended solids (TSS), and phosphorus by WATS ▪ Post-excavation confirmation sampling (sediment) — PCBs by WATS
Quality control tasks:	The samples will be collected and processed, and the laboratory waste will be disposed of as described in the laboratory SOPs (Attachment 1-5). QA samples will be collected as described in Worksheet #26.
Secondary data:	See Worksheets #13-1 and #13-2.

QAPP Worksheet #14
Summary of Project Tasks

SAMPLING AND ANALYSIS TASKS	
Predesign Investigations for the Remedial Design for the 12th Street Landfill (Operable Unit No. 4)	
Sampling tasks:	Field data collection activities during the predesign investigations will include: ▪ Visual information obtained by the advancement of test pits ▪ Visual information obtained by the advancement of Geoprobe® borings ▪ Gas concentrations (methane, carbon dioxide, and oxygen) measured in existing monitoring wells and in the Geoprobe® locations. Pressure measured in existing monitoring wells.
Analysis tasks:	No analytical data will be collected.
Quality control tasks:	No analytical data will be collected.
Secondary data:	See Worksheet #13-1.
DATA MANAGEMENT, DOCUMENTATION, RECORDS, AND AUDIT TASKS	
Data management tasks:	▪ **Field data reduction** - Raw data from field measurements and sample collection activities will be recorded as specified in the FSP. If the data are to be used in the project reports, they will be reduced or summarized, and the method of reduction will be documented in the report. With the exception of the temperature correction for specific conductance, no calculation will be involved in field data reduction. Only direct-reading instrumentation will be employed in the field. The On-Site Coordinator or designee will proofread all forms and notebooks to determine if transcription errors have been made by the field crew. ▪ **Laboratory data reduction** - WATS will perform in-house analytical data reduction under the direction of the laboratory QA/QC Manager. The laboratory QA/QC Manager will be responsible for assessing data quality and advising of any data that were rated "preliminary" or "unacceptable" or of other notations that would caution the data user of possible unreliability. Data reduction, by the laboratory, will be conducted as follows:

QAPP Worksheet #14
Summary of Project Tasks

DATA MANAGEMENT, DOCUMENTATION, RECORDS, AND AUDIT TASKS	
Data management tasks: *(continued)*	— The analysts who produced the laboratory data will first conduct a systematic review (Level 1 Review). — An experienced peer, supervisor, or designee will examine the data (the Level 2 Review) to ensure that the Level 1 review has been completed correctly and thoroughly. Following the Level 2 review, the data will be turned over to the Laboratory Project Manager for a third-level review. — The Project Manager will review the data for completeness and attainment of quality control criteria as outlined in the U.S. EPA methods and for overall reasonableness. — The Project Manager will verify the accuracy and completeness of the final reports. — The Laboratory QA/QC Manager and the supervisor of the pertinent analytical section, in conjunction with the RMT Laboratory Coordinator, will decide whether any sample reanalysis is required. Data reduction procedures are included in the U.S. EPA-approved methods and associated laboratory SOPs. ▪ **Field data reporting** - Field data reporting will consist of field logs and calibration and measurement records documenting site activities as described in the FSP and on the sample Chain-of-Custody Records. ▪ **Laboratory data reporting** - The analytical laboratories will prepare and retain full analytical and QC documentation. Such retained documentation need not be on hard (paper) copy, but may be in other storage media (*e.g.*, computer diskette or magnetic tape). As needed, WATS will supply a hard copy of the retained information. WATS will provide the following information in each analytical data package submitted: — Dated cover sheets, signed by the WATS project manager, listing a laboratory batch number; the analyses performed; the number of samples and respective matrices; the project name and number; narrative comments describing deviations from intended analytical strategy, and any problems encountered in analysis; a discussion of any laboratory quality control checks that failed to meet project criteria; and the signature of the laboratory QA/QC Manager — Tabulated results of inorganic and organic compounds identified and quantified, including sample preparation and analysis dates, and cross-references of laboratory and field sample identification numbers — Analytical results for QC sample spikes and sample duplicates; initial and continuing calibration verifications of standards and blanks; standard procedural blanks; laboratory control samples; and the data produced by ICP interference check samples, as appropriate for the specified analyses — Tabulation of Method Detection Limits, as appropriate — Raw data system printouts (or legible photocopies) identifying the date of analyses, the mass spectra tuning data, the name of the analyst, the parameters determined, the initial and continuing calibration, the calibration verification summary, the method blanks, the sample and any dilutions, sample duplicates and spikes, chromatograms, GC/MS spectra, computer printouts, internal standard area and RT summary, cleanup information, control samples, ICP outputs, and inter-element correction data

QAPP Worksheet #14
Summary of Project Tasks

DATA MANAGEMENT, DOCUMENTATION, RECORDS, AND AUDIT TASKS	
Data management tasks: *(continued)*	WATS will provide the following information for the indicator parameters in each analytical data package submitted: — Dated cover sheets listing a laboratory batch number; the analyses performed; the number of samples and respective matrices; project name and number; narrative comments describing deviations from intended analytical strategy, and problems encountered in analysis; discussion of any laboratory quality control checks that failed to meet project criteria; and the signature of the Laboratory QA Manager — Copies of bench sheets that include summaries of initial calibration and continuing calibration check results — Summary of QC sample analysis (spikes, duplicates, laboratory control samples, and blanks). A report will be prepared containing a QA/QC section summarizing the quality of the data. The QA report prepared by the RMT will address the assessment of data precision, accuracy, completeness, and comparability; the results of performance audits, if any; the results of system audits; any reported nonconformances; any significant QA/QC problems and recommended solutions; the results of corrective actions since the last report; and approved revisions to the QA/QC processes. The report will indicate whether the QA objectives were met and whether the data can be used for the intended purposes based on an evaluation of compliance with control limits, the results of audits, and compliance with the procedures specified in the QAPP and the FSP.
Documentation and records:	Appropriate records will be maintained to provide adequate documentation of the entire data generation process, including field sampling and laboratory analysis. ▪ **Field documentation -** Field personnel will develop and retain comprehensive records of field activities, including field sampling, field analysis, and sample Chain-of-Custody, to allow a reconstruction of field events and sample handing during data review and interpretation. ▪ **Laboratory project files -** WATS will maintain a file for pertinent project information, including Chain-of-Custody Records; other custody documents (air bills, etc.); work orders; Sample Receipt Acknowledgment Forms, if any; instrument detection limit and control limit tabulations; all raw analytical data on bench sheets; laboratory data; and project communication records. Such retained documentation need not be on hard (paper) copy, but may be in other storage media (*e.g.*, computer diskette or magnetic tape). As needed, WATS will supply a hard copy of the retained information. ▪ **Laboratory notebooks -** Logbooks, bench sheets, instrument notebooks, and instrument printouts will be retained as part of the permanent laboratory record, including the associated quality controls. Each page in the laboratory logbooks and bench sheets will be signed and dated by the analyst, and errors will be crossed out in indelible ink. System printouts of raw inorganic and organic data will include dates of analyses; analyst's name; parameters determined; calibration curve; calibration verifications; method blanks; sample number and dilutions performed; and sample duplicates, spikes, and control samples. Internal laboratory QC sample results will be indicated on the analytical bench sheets and will include sample spikes, sample duplicates, initial and continuous calibration verification of standards and blanks, standard procedural blanks, laboratory control samples, ICP serial dilutions, and ICP interference check samples.

QAPP Worksheet #14
Summary of Project Tasks

DATA MANAGEMENT, DOCUMENTATION, RECORDS, AND AUDIT TASKS	
Documentation and records: *(continued)*	▪ **Computer and hard copy storage -** All electronic files and deliverables will be retained by the laboratory for no less than 5 years. Weyerhaeuser, or its designated representatives, will retain copies of the analytical data reports according to the requirements of the laboratory QA Manual. All field records will be kept in the central project file at the RMT office at 744 Heartland Trail, Madison, Wisconsin; and records will be included in project reports, as appropriate, or upon request by the U.S. EPA RPM. ▪ **Field data reporting -** Field data reporting will consist of field notebooks and logs, photographs, boring logs, calibration and measurement records, and Chain–of-Custody (COC) documentation, including field quality control samples that will be collected to assess the quality of the analytical data and to evaluate sampling and analytical reproducibility. Field records will be reviewed by the Project Coordinator for consistency with the planned activities, and any concerns will be discussed with the Field Sampling Coordinator. Field performance and field system audits will also be performed, as discussed below and in Worksheets #31 and 32. ▪ **Laboratory data reporting -** Analytical data for this project will be reported in both an electronic data deliverable (EDD) and an analytical data package. The EDD will be generated by WATS and will be used by RMT to facilitate loading the analytical data into the project database. The Laboratory QA/QC Manager will perform a final review of the report summaries and case narratives to determine if the report meets project requirements. The task of reporting laboratory data to the U.S. EPA will begin after the data review activity has been concluded. The validated analytical data will be provided to the U.S. EPA in accordance with the project schedule (Worksheet #16). In addition to the COC Record, WATS will prepare and provide a full "CLP-like" data package, including the following: — **Case narrative -** date of issuance; laboratory analysis performed; any deviations from required analytical methods; laboratory sample lot numbers; numbers of samples and respective matrices; QC procedures used and references to the acceptance criteria; laboratory report table of contents; project name and number; condition of samples upon receipt; dates of extraction, preparation, and analysis; discussion of whether or not sample holding times were met; discussion of technical problems or other observations that may have created analytical difficulties; discussion of any laboratory QC checks that failed to meet project criteria; signature of the laboratory Project Manager, and copies of the COC Records — **Chemistry data package -** run log, summary page indicating dates of analyses for samples and laboratory QC checks, cross-referencing of laboratory sample to project sample identification numbers, adequately described data qualifiers, sample preparation and analysis methods, sample results, matrix spike and matrix spike duplicate (MS/MSD) recoveries, laboratory control sample recoveries, method blank results, and surrogate recoveries Soil sample analytical data generated by the laboratory will be reported in micrograms per kilogram (μg/kg) on a dry-weight basis. Groundwater data will be reported in micrograms per liter (μg/L). Results between the laboratory Method Detection Limit (MDL) and the Quantitation Limit (QL) will be reported. Data retained in the project database may be converted to units other than those reported by the laboratories. Sample results will not be corrected for contamination found in laboratory blanks. However, sample results may be qualified as not detected based on laboratory, field, and/or trip blank contamination.

QAPP Worksheet #14
Summary of Project Tasks

DATA MANAGEMENT, DOCUMENTATION, RECORDS, AND AUDIT TASKS	
Documentation and records: *(continued)*	WATS will provide the following information in each analytical data package submitted: ▪ Dated cover sheets, signed by the WATS Project Manager, listing a laboratory batch number; the analyses performed; the number of samples and the respective matrices; the project name and number; narrative comments describing deviations from intended analytical strategy, and problems encountered in analysis; a discussion of any laboratory quality control checks that failed to meet project criteria; and the signature of the laboratory QA/QC Manager ▪ Tabulated results of inorganic and organic compounds identified and quantified, including sample preparation and analysis dates, and cross-references of laboratory and field sample identification numbers ▪ Analytical results for QC sample spikes, sample duplicates, and blanks; initial and continuing calibration verifications of standards and blanks; standard procedural blanks; laboratory control samples; and the data produced by inductively coupled plasma (ICP) interference check samples, as appropriate for the specified analyses ▪ Tabulation of Method Detection Limits, as appropriate ▪ Raw data system printouts (or legible photocopies) identifying dates of analyses, mass spectra tuning data, name of analyst, parameters determined, initial and continuing calibration, calibration verification summary, method blanks, sample and any dilutions, sample duplicates and spikes, chromatograms, gas chromatograph/mass spectrophotometer (GC/MS) spectra, computer printouts, internal standard area and retention time (RT) summary, cleanup information, control sample results, ICP outputs, and inter-element correction data

QAPP Worksheet #14
Summary of Project Tasks

DATA MANAGEMENT, DOCUMENTATION, RECORDS, AND AUDIT TASKS	
Assessment/Audit tasks:	Performance and system audits will be completed in the field and laboratory, as described below and in Worksheets #31 and 32. ▪ **Field audits** - The Project Coordinator will monitor day-to-day field performance through daily communications with the on-site Field Sampling Coordinator and the Construction Manager. In addition, field performance audits and field system audits will be performed, as follows: — **Field performance audits** - Field performance audits will be conducted in order to confirm that the activities are being performed according to the established plans. The field performance audit(s) will be performed by the Senior Consultant QA Manager (or her designee), at a frequency that is appropriate for the field activities being performed. The audit(s) will include a discussion of the project progress with the Project Coordinator and/or the review of field reports, as appropriate. The Senior Consultant QA Manager will record and document any observations made during field system audits, and will discuss the audit and any recommended changes/deviations to the field procedures with the Project Coordinator. — **Field system audits -** Field system audits will be performed by the Data QA Manager, including a review of rinse and trip blank data to identify potential deficiencies in field sampling and decontamination procedures, and a comparison of the scheduled QA/QC activities described in this QAPP with the QA/QC procedures being performed on the project. Field system audits will be performed at a frequency appropriate for the field activities. The Data QA Manager will record and document any observations made during field system audits, and will discuss the audit and any recommended changes/deviations to the field procedures with the Project Coordinator. ▪ **Laboratory audits -** Laboratory audits will be performed, as follows: — **Internal audits** - The Laboratory QA/QC Manager (or his designee) will conduct internal laboratory audits periodically. This will include an overall evaluation of the performance of laboratory staff and a comparison of laboratory procedures with the laboratory QA Manual and SOPs. Results of the audits will be summarized and distributed to appropriate laboratory staff. — **External audits -** The Data QA Manager will review the laboratory QA Manual and applicable SOPs, and will discuss laboratory procedures with the Laboratory QA/QC Manager prior to the start of project sampling. The Data QA Manager will record and document any observations made during the review. In addition, as a participant in state and federal certification programs, the laboratory is audited by representatives of the regulatory agency issuing certification. Audits include a review of sample handling and tracking documentation, analytical methodologies, analytical supportive documentation, and final reports. The audit findings are documented and submitted to the laboratory for corrective action, if necessary. ▪ **Corrective action** - Corrective actions are required when field or analytical data are not within the objectives specified in this QAPP, as follows:

QAPP Worksheet #14
Summary of Project Tasks

DATA MANAGEMENT, DOCUMENTATION, RECORDS, AND AUDIT TASKS	
Assessment/Audit tasks: *(continued)*	— **Field measurement corrective action** - Corrective action in the field may be necessary when the sample network is changed (*i.e.*, more/fewer samples, sampling locations other than those specified in the FSP, etc.), or when sampling procedures and/or field analytical procedures require modification in response to unexpected conditions. Technical staff and project personnel will be responsible for reporting all suspected technical or QA nonconformances or deficiencies of any activity or issued document by reporting the situation to the RMT on-site Field Sampling Coordinator or designee. The Field Sampling Coordinator will assess the suspected problems in consultation with the Project Coordinator or Data QA Manager or designee, and will assist in making a decision based on the potential for the situation to impact the data quality. If it is determined that the situation warrants a reportable nonconformance requiring corrective action, the On-Site Coordinator will initiate a nonconformance report. If appropriate, the RMT Field Sampling Coordinator will ensure that no additional work that is dependent on the nonconforming activity is performed until the corrective actions are completed. — **Laboratory corrective action** - Corrective actions are required whenever an out-of-control event or potential out-of-control event is noted. Corrective actions may be necessary if any of the following occur: ▪ QC data are outside the warning or acceptable windows for precision and accuracy. ▪ Blanks contain target analytes above acceptable levels. ▪ Undesirable trends are detected in spike recoveries or the RPD between duplicates. ▪ There are unusual changes in detection limits. ▪ Deficiencies are detected by the QA Manager during internal or external audits or from the results of performance evaluation samples. ▪ Inquiries concerning data quality are received. Corrective actions should be timely, and they should determine the root cause and evaluate any propagation of the error or problem. The investigative action taken is somewhat dependent on the analysis and the event. Corrective action in the laboratory may occur prior to, during, or after the initial analysis. Corrective action is under the supervision of the Laboratory QA/QC Manager. Following a consultation with laboratory scientists, technicians, and team leaders, it may be necessary for the QA Manager to approve the implementation of the corrective action. Some conditions during or after analysis may automatically trigger corrective action or optional procedures. These conditions may include dilution of samples, additional sample extract cleanup, automatic reinjection/reanalysis when certain quality control criteria are not met, etc. WATS's corrective action procedures are documented in Laboratory SOPs specifying corrective action to be taken when an analytical error is discovered or the analytical system is found to be out of control.

QAPP Worksheet #14
Summary of Project Tasks

DATA MANAGEMENT, DOCUMENTATION, RECORDS, AND AUDIT TASKS	
Assessment/Audit tasks: *(continued)*	Depending on the problem, the corrective action employed may be formal or informal. On-the-spot actions are used to correct minor problems, such as recalibration, retuning, or a minor repair (*e.g.*, replacement of a minor part) of a malfunctioning instrument or the correction of poor analytical technique being used. Corrective action procedures may be handled at the bench level by the analyst, who reviews the preparation or extraction procedure that was used for possible errors, and checks the instrument calibration, spike, and calibration mixes, and the instrument sensitivity. These occurrences are documented in the appropriate injection, run, or analysis logbooks. Similarly, routine instrument maintenance, malfunctions, and power failures are also documented in the appropriate instrument maintenance logbooks. If the problem persists or cannot be identified, the matter may be referred to the laboratory team leader, and/or QA/QC Manager for further investigation. Occurrence of the problem, the corrective action employed, and verification that the problem has been eliminated will be properly documented. The corrective action procedure will be discussed with the Laboratory Project Manager, and full documentation of the corrective action procedure, whether resolved or not, will be placed in the laboratory project file. Corrective actions specific to analytical methods are discussed in the operational-specific SOPs. The U.S. EPA RPM or the RMT Data QA Manager may request corrective action for any nonconformance identified by audits or data validation. — **Corrective action during data validation and data assessment -** The need for corrective actions may be identified during data validation or data assessment. Potential types of corrective action may include resampling by the field team or reinjection/reanalysis of samples by the laboratory. Data validation corrective actions may include notification of the laboratory of incomplete or erroneous reports and a request for issuance of corrected versions. When the Data QA Manager identifies a corrective action situation, the Project Coordinator will approve the implementation of corrective action, including possible resampling. The RMT Data QA Manager will notify the laboratory of incomplete or erroneous reports and will request the issuance of corrected versions. All corrective actions will be documented. Final summary data tables will not be issued until all data have been validated and all corrections have been made. Corrective action may include the following: ▪ Reanalysis of samples, if holding time requirements permit ▪ Resampling and analysis ▪ Evaluation and amendment of sampling procedures ▪ Evaluation and amendment of analytical procedures ▪ Acceptance of data and acknowledgment of the level of uncertainty
Data Review tasks:	See Worksheets #36 and 37.

QAPP Worksheet #15-1
Reference Limits and Evaluation (Surface Water)

ANALYTE	CAS NUMBER	PROJECT ACTION LIMIT[1]	WATER (µg/L)[2]	
			LABORATORY MDL	LABORATORY RL
PCBs (U.S. EPA 608)[3]				
Aroclor - 1016	12674-11-2	--	0.10	0.2
Aroclor - 1221	11104-28-2	--	--	0.2
Aroclor - 1232	11141-16-5	--	--	0.2
Aroclor - 1242	53469-21-9	--	--	0.2
Aroclor - 1248	12672-29-6	--	--	0.2
Aroclor - 1254	11097-69-1	--	--	0.2
Aroclor - 1260	11096-82-5	--	0.10	0.2
Total PCBs	1336-36-3	0.2 µg/L	--	0.2
Inorganics (Wet Chemistry)[4]				
TSS (U.S. EPA 160.2)	--	30-45 mg/L	--	5.0 mg/L[5]
Total phosphorus as P (U.S. EPA 365.2)	--	--	--	0.01 mg/L

Footnotes:

(1) Standards are consistent with the Multi-Area Quality Assurance Project Plan (Rev. 00) For the Kalamazoo River Study Group (Arcadis BBL, 2007b), which are from the MDEQ's Substantive Requirements Document for the Plainwell Dam Superfund Site, dated February 13, 2007. The TSS standards are on a monthly and daily basis, respectively.

(2) Concentrations are in µg/L, except where noted.

(3) U.S. EPA. *Appendix A to Part 136 Methods for Organic Chemical Analysis of Municipal and Industrial Wastewater Method 608—Organochlorine Pesticides and PCBs*. July 1995.

(4) U.S. EPA. *Methods for Chemical Analysis of Water and Wastes*. EPA/600/4-79/020. EMSL-Cincinnati. 1983.

(5) The actual Reporting Limit will depend on the volume of sample filtered.

Notes:
RL = reporting limit.
MDL = Method Detection Limit.
µg/L = micrograms per liter.
mg/L = milligrams per liter.
PCBs = polychlorinated biphenyls.

QAPP Worksheet #15-2
Reference Limits and Evaluation (Soil/Sediment)

ANALYTE	CAS NUMBER	PROJECT ACTION LIMIT[1] (mg/kg)	SOIL AND SEDIMENT(μg/kg)[2]	
			LABORATORY MDL	LABORATORY RL
PCBs (U.S. EPA 8082)[3]				
Aroclor - 1016	12674-11-2	--	--	10
Aroclor - 1221	11104-28-2	--	--	20
Aroclor - 1232	11141-16-5	--	--	10
Aroclor - 1242	53469-21-9	--	--	10
Aroclor - 1248	12672-29-6	--	--	10
Aroclor - 1254	11097-69-1	--	--	10
Aroclor - 1260	11096-82-5	--	--	10
Total PCBs	1336-36-3	4 mg/kg	NA	20

Footnotes:
(1) Project action limit is based on the direct contact criterion for residential sites (MDEQ Part 201 Generic Cleanup Criteria and Screening Levels, January 23, 2006)
(2) The target reporting limit is based on wet weight. The actual reporting limit will vary based on sample weight and moisture content.
(3) U.S. EPA. Office of Solid Waste and Emergency Response. *Test Methods for Evaluating Solid Waste,* SW-846 3rd Edition. Washington, DC. 1996.

Notes:
RL = reporting limit.
MDL = Method Detection Limit.
μg/kg = micrograms per kilogram.
PCBs = polychlorinated biphenyls.
NA = not applicable.

QAPP Worksheet #16-1
Project Schedule/Timeline
(Emergency Response Activities in the Former Powerhouse Discharge Channel)

ACTIVITIES	ORGANIZATION	DATES (MM/DD/YY)		DELIVERABLE	DELIVERABLE DUE DATE
		ANTICIPATED DATE(S) OF INITIATION	ANTICIPATED DATE OF COMPLETION		
Geotechnical Investigation	RMT	5/21/07	6/30/07	Technical Memorandum	Incorporated into Design Report
Bathymetry and visual sediment assessment	RMT	6/12/07	6/22/07	Technical Memorandum	Incorporated into Design Report
Remedial design	RMT	6/4/07	6/25/07	Emergency Response Work Plan	6/26/7 – Draft 8/1/07 – Final
		6/1/07	6/25/07	Field Sampling Plan	6/26/07 – Draft 8/1/07 – Final
		5/15/07	6/20/07	Quality Assurance Project Plan (QAPP)	6/21/07 – Draft 8/1/07 – Final
		5/30/07	7/27/07	Emergency Response Design Plan, including Schedule	7/28/07
Remedial construction	RMT	7/30/07	11/8/07	Emergency Response Documentation Report	1/31/08

QAPP Worksheet #16-2
Project Schedule/Timeline
(Emergency Response Activities on the Plainwell Mill Banks)

ACTIVITIES	ORGANIZATION	DATES (MM/DD/YY) ANTICIPATED DATE(S) OF INITIATION	DATES (MM/DD/YY) ANTICIPATED DATE OF COMPLETION	DELIVERABLE	DELIVERABLE DUE DATE
Visual soils and sediment assessment	RMT	7/16/07	7/30/07	Technical Memorandum	Incorporated into Design Report
Remedial design	RMT	7/23/07	6/25/07	Emergency Action Conceptual Design Approach	8/14/07
		8/15/07	9/30/07	Field Sampling Plan Addendum	9/10/07 – Draft 9/30/07 – Final
		8/15/07	9/30/07	Quality Assurance Project Plan (QAPP) Addendum	9/10/07 – Draft 9/30/07 – Final
		8/15/07	9/30/07	Emergency Response Design Plan, including Schedule	9/5/07
Remedial construction	RMT	9/15/07	12/31/07 (field work) 3/30/08 (report)	Emergency Response Documentation Report	2/28/08

QAPP Worksheet #16-3
Project Schedule/Timeline
(Predesign Investigations for the Remedial Design for the 12th Street Landfill)

ACTIVITIES	ORGANIZATION	DATES (MM/DD/YY) ANTICIPATED DATE(S) OF INITIATION	ANTICIPATED DATE OF COMPLETION	DELIVERABLE	DELIVERABLE DUE DATE
Conduct predesign field activities	Weyerhaeuser/RMT	May/June 2008, as weather allows	May/June 2008, as weather allows	Section of the RD report or a technical memorandum	To be determined pending U.S. EPA approval of accelerated RD process
Draft remedial design	Weyerhaeuser/RMT	June 2008	August 2008	Draft RD report	
Final remedial design	Weyerhaeuser/RMT	October 2008	November 2008	Final RD report	
Draft remedial action workplan	Weyerhaeuser/RMT	December 2008	January 2009	Draft Remedial Action Workplan	
Final remedial action workplan	Weyerhaeuser/RMT	February 2009	March 2009	Final Remedial Action Workplan	

QAPP Worksheet #17-1
Sampling Design and Rationale (Former Powerhouse Discharge Channel)

Describe and provide a rationale for choosing the sampling approach (*e.g.*, grid system, biased statistical approach):

Surface Water Quality:

The upstream turbidity samples will be taken at a location near the Plainwell spillway and then at two downstream locations approximately 200 feet and 300 feet downstream of the work area along the path of the water flowing past the work area as described in worksheet #11. The sample collected at 200 feet downstream will serve as a warning to address site actions if elevated results are measured. Water quality may be impacted in the immediate vicinity of the former powerhouse discharge channel; therefore, the sampling locations were established downstream in the main channel to determine if the residuals removal activities were impacting water quality of the wider river system.

Sediment Sampling:

The suggested sampling protocol for the former powerhouse discharge channel is consistent with the grid format and the quantity of samples targeted for confirmation sampling for the Plainwell Impoundment TCRA. Sampling of the former powerhouse discharge channel would consist of establishing sample areas that will each contain approximately 20 grids with each grid having an area of approximately 400 square feet. Five samples will be collected from each area in a semi-random fashion that will ensure adequate coverage across the entire area. All confirmatory samples will be collected by hand (*e.g.* using a trowel), targeting a sediment depth of 0-6 inches.

Water Treatment System:

Sampling for the water treatment system is similar to that proposed for the Plainwell Impoundment TCRA. This sampling program will provide adequate protection for the receiving surface water.

Describe the sampling design and rationale in terms of what matrices will be sampled, what analytical groups will be analyzed and at what concentration levels, the sampling locations (including QC, critical, and background samples), the number of samples to be taken, and the sampling frequency (including seasonal considerations):

Refer to Worksheet #18-1.

QAPP Worksheet #17-2
Sampling Design and Rationale (Plainwell Mill Banks)

Describe and provide a rationale for choosing the sampling approach (*e.g.*, grid system, biased statistical approach):

Surface Water Quality:

Same as Worksheet 17-1.

Sediment Sampling:

The suggested sampling protocol for the Plainwell Mill banks is consistent with the grid format and the quantity of samples targeted for confirmation sampling for the Plainwell Impoundment TCRA. Sampling of the Plainwell Mill banks would consist of establishing sample areas that will each contain approximately 20 grids; for floodplain/near-shore sediment excavation areas, the sample area will cover approximately 5,000 square feet and will be divided into 20 grids (10 feet by 25 feet); for bank excavation areas, the sample area will cover 1,000 square feet and will be divided into 20 grids (5 feet by 10 feet). Five samples will be collected from each area in a semi-random fashion that will ensure adequate coverage across the entire area. All confirmatory samples will be collected by hand (*e.g.* using a trowel), targeting a soil and sediment depth of 0 to 6 inches.

Water Treatment System:

Same as Worksheet 17-1.

Describe the sampling design and rationale in terms of what matrices will be sampled, what analytical groups will be analyzed and at what concentration levels, the sampling locations (including QC, critical, and background samples), the number of samples to be taken, and the sampling frequency (including seasonal considerations):

Refer to Worksheet #18-1.

QAPP Worksheet #17-3
Sampling Design and Rationale
(Predesign Investigations for the Remedial Design for the 12th Street Landfill)

Describe and provide a rationale for choosing the sampling approach (*e.g.*, grid system, biased statistical approach):

The sampling approach was based on a review and determination of potential additional data needs. Specifically, RMT reviewed the available information, which was gathered during numerous site investigations (see Worksheet #13-1), and then compared the scope of the available information to that which may be needed to complete the remedial design. The sampling approach detailed in Worksheets #10-3 and #11-3 (i.e., test pits to visually determine the extent of paper residuals beyond the toe of the landfill, Geoprobe® borings to determine the thickness of paper residuals along the property lines, and gas measurements in existing monitoring wells and the Geoprobe® borings) will be used to supplement the already extensive information that is available for the remedial design.

Describe the sampling design and rationale in terms of what matrices will be sampled, what analytical groups will be analyzed and at what concentration levels, the sampling locations (including QC, critical, and background samples), the number of samples to be taken, and the sampling frequency (including seasonal considerations):

No samples will be collected for laboratory analysis.

QAPP Worksheet #18-1
Sampling Locations and Methods/SOP Requirements
(Emergency Response Activities)

SAMPLING LOCATION/ID NUMBER	MATRIX	ANALYTICAL GROUP	CONCENTRATION LEVEL	NUMBER OF SAMPLES[2] (identify field duplicates)	SAMPLING SOP REFERENCE[1]	RATIONALE FOR SAMPLING LOCATIONS
Surface water quality monitoring	Water	Total PCBs	Normal	Weekly during construction	F-1	One upstream and two downstream locations (mid-channel, mid-depth)
		Turbidity	Normal	Periodic monitoring during construction using in-stream sampling equipment	F-2	One upstream and two downstream locations (mid-channel, mid-depth)
Post-construction in former powerhouse discharge channel	Sediment	Total PCBs	Normal	Minimum of five samples per 8,000-square foot area, as described in Worksheet #17	F-3	Surface samples (*i.e.*, 0 to 6 inches) obtained to verify removal effectiveness
Water treatment system	Treated water	Total PCB TSS Total phosphorus	Normal	Twice per week during system operation	F-5	Discharge location

Footnote:

(1) See Project Sampling SOP References table (Worksheet #21).

(2) Field duplicates will be collected at a frequency of one duplicate for every 10 samples (Worksheet #20).

QAPP Worksheet #18-2
Sampling Locations and Methods/SOP Requirements
(Predesign Investigations for the Remedial Design for the 12th Street Landfill)

SAMPLING LOCATION/ID NUMBER	MATRIX	ANALYTICAL GROUP	CONCENTRATION LEVEL	NUMBER OF SAMPLES (identify field duplicates)	SAMPLING SOP REFERENCE[1]	RATIONALE FOR SAMPLING LOCATIONS
Test pits	Soil	None	Not applicable	3 test pits in the wetlands north of the landfill, 3 test pits on the quarry property, and 4 test pits on the State property[2]	Not applicable	Potential data gaps, based on previously available information (see Worksheet #13-1)
Geoprobe® borings	Soil	None	Not applicable	9 Geoprobe® borings into the 12th Street Landfill At least 2 Geoprobe® borings near the southern end of the landfill	F-5	Potential data gaps, based on previously available information (see Worksheet #13-1)
Landfill gas measurements	Soil gas	None	Not applicable	As may be readily accessible, 3 existing groundwater monitoring wells screened in the vadose zone (MW-6A, MW-7A, and MW-8A) and Geoprobe® borings installed as part of this investigation	F-7	May be useful to support existing information (see Worksheet #13-1). Collection of this data is not essential because Weyerhaeuser has decided to include a gas venting system in the final landfill cover design.

Footnote:

(1) See Project Sampling SOP References table (Worksheet #21).

(2) In the event that in-field conditions limit the use of test pit excavating equipment (e.g., a backhoe), other tools, such as hand augers or shovels, may be used instead.

QAPP Worksheet #19
Analytical SOP Requirements

MATRIX	ANALYTICAL GROUP	CONCENTRATION LEVEL	ANALYTICAL AND PREPARATION METHOD/SOP REFERENCE[1]	SAMPLE VOLUME	CONTAINERS (number, size, and type)	PRESERVATION REQUIREMENTS (chemical, temperature, light protected)	MAXIMUM HOLDING TIME (preparation/ analysis)
Water	PCBs	All	W-1	2 liters	Two 1-liter amber glass bottles with Teflon®-lined lid	Cool to 4°C ±2°	14 days to extraction; 40 days to analysis
Water	TSS	All	W-2, W-5	1 liter	One 1-liter plastic container	Cool to 4°C ±2°	7 days to analysis
Water	Total phosphorus	All	W-3	500 mL	One 500-mL plastic container	H_2SO_4 to pH<2; cool to 4°C	28 days to analysis
Soil/Sediment	PCBs	All	W-4	200 grams	One 8-oz glass jar with Teflon®-lined lid	Cool to 4°C ±2°	14 days to extraction; 40 days to analysis

Footnote:
(1) See the Analytical SOP Reference (Worksheet #23).

QAPP Worksheet #20
Field Quality Control Sample Summary

MATRIX	ANALYTICAL GROUP	CONCENTRATION LEVEL	ANALYTICAL AND PREPARATION SOP REFERENCE[1]	NUMBER OF SAMPLING LOCATIONS	NUMBER OF FIELD DUPLICATE PAIRS	MATRIX SPIKES	NUMBER OF FIELD BLANKS	NUMBER OF EQUIPMENT BLANKS	TOTAL NUMBER OF SAMPLES TO LABORATORY
Water	PCB	All	W-1	TBD	1/10	1/20	TBD	1/10	TBD
Water	TSS	All	W-2, W-5	TBD	1/10	NA	TBD	1/10	TBD
Water	Total phosphorus	All	W-3	TBD	1/10	1/20	TBD	1/10	TBD
Soil/Sediment	PCB	All	W-4	TBD	1/10	1/20	TBD	1/10	TBD

Footnote:

(1) See Analytical SOP Reference (Worksheet #23).

Note:

NA = not applicable.

QAPP Worksheet #21
Project Sampling SOP Reference

REFERENCE NUMBER	TITLE, REVISION DATE, AND/OR NUMBER	ORIGINATING ORGANIZATION	EQUIPMENT TYPE	MODIFIED FOR PROJECT WORK? (Y/N)	COMMENTS
F-1	Water Sampling and Field Measurement Procedures	RMT	Kemmerer water sampler, peristaltic pump, ISCO automated sampler, YSI 6920 sonde unit, appropriate sample containers	Y	Sample method is dependent on water conditions at the sample location and specified analysis required
F-2	Surface Water Flow Measurement Procedures	RMT	electromagnetic velocity meter	Y	--
F-3	Water Treatment System Monitoring Procedures	RMT	appropriate sample containers	Y	--
F-4	Sediment Sampling Procedures	RMT	Trowel, stainless steel scoop, bucket auger, tube auger, coring device	Y	Sample method is dependent of sediment site characteristics
F-5	Soil Sampling Procedures Direct Push Sampler	RMT	--	Y	--
F-6	Surficial Soil Sampling Procedures	RMT	Trowel, stainless steel scoop	--	Confirmation sampling will consist of collecting surficial soil samples
F-7	Soil Gas Monitoring	RMT	Geoprobe® rods utilizing the Post Run Tubing (PRT) system and drive point; tubing; Landtec gas monitor	Y	--
F-8	Groundwater Sampling Procedures	To be determined	--	--	--

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QAPP Worksheet #22
Field Equipment Calibration, Maintenance, Testing, and Inspection

FIELD EQUIPMENT	CALIBRATION ACTIVITY	MAINTENANCE ACTIVITY	TESTING ACTIVITY	INSPECTION ACTIVITY	FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION	RESPONSIBLE PERSON	SOP REFERENCE(1)
Multi-parameter Sonde	F-1	Per SOP and manufacturer's specifications	Turbidity, temperature, pH, conductivity, DO	Check membranes and verify accurate operation	Weekly	F-1	F-1	F-1	YSI Environmental Operations Manual
ISCO sampler	Verify sample volumes	Battery charging	Collecting appropriate sample volumes	Check battery operation and tubing	Daily	F-1	F-1	F-1	F-1
Landtec gas sampler, or equivalent	F-7	Per manufacturer's specifications	Measuring concentration of methane, carbon dioxide, and oxygen	Check tubing and sample port integrity	Daily	F-7	F-7	F-7	F-7
Magnehelic pressure gauge, or equivalent	F-7	Per manufacturer's specifications	Measuring pressures	Check tubing and sample port integrity	Daily	F-7	F-7	F-7	F-7

(1) See Project Sampling SOP Reference table (Worksheet #21).

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QAPP Worksheet #23
Analytical SOP References

REFERENCE NUMBER	TITLE, REVISION DATE, AND/OR NUMBER	DEFINITIVE OR SCREENING DATA	ANALYTICAL GROUP	INSTRUMENT	ORGANIZATION PERFORMING ANALYSIS	MODIFIED FOR PROJECT WORK? (Y/N)
W-1	Organochlorine and PCB (aroclor) pesticide analysis by GC/ECD, AM E-608, June 20, 2003	Definitive	Total PCB in water	Gas chromatography/ Electron capture detectors (GC/ECD)	Weyerhaeuser Analysis and Testing Services (WATS)	N
W-2	Suspended solids in water and wastewater. AM E-160.2, April 24, 2002	Definitive	TSS	Balance	WATS	N
W-3	Total and total soluble phosphorus in water, AM E-365.3, August 11, 2004	Definitive	Total phosphorus as P in water	Spectrophotometer	WATS	N
W-4	Polychlorinated biphenyl analysis by GC/ECD, AM E-8082, June 20, 2003	Definitive	Total PCB in soil and sediment	GC/ECD	WATS	N
W-5	Daily balance, water, and temperature checks, AQ-O-DLYCHK, July 7, 2005	Definitive	TSS	Balance	WATS	N

QAPP Worksheet #24
Analytical Instrument Calibration

INSTRUMENT	CALIBRATION PROCEDURE	FREQUENCY OF CALIBRATION	ACCEPTANCE CRITERIA	CORRECTIVE ACTION (CA)	PERSON RESPONSIBLE FOR CA	SOP REFERENCE[1]
GC/ECD	Five-point calibration Aroclors 1016 and 1260 mixture in concentration range that brackets linear range of detector. Calibrate by using the three to five characteristic peaks for each particular Aroclor. All other Aroclors are quantitated based on one-point standard calibration.	After initial calibration, a check standard of the match-point Aroclor 1016/1260 mixture is analyzed after every 10 samples and at the end of the sequence.	Initial calibration RSD for 1016/1260 ≤ 20% or linear regression >0.99	See SOPs W-1 and W-4. RSD ≤ 20%. Linearity: r ≥ 0.99. If routine maintenance does not return the instrument performance to meet the QC requirements, a new calibration must be performed. Reanalyze continuing calibration verification (CCV). If still outside criteria, recalibrate and run all samples since last successful CCV.	Analyst	W-1 and W-4
	Continuing calibration—before sample analysis, one standard (midpoint).	A midpoint 1016/1260 mixture is analyzed after every 10 samples and at the end of the sequence.	Check standard or continuing calibration standard must not exceed a percent difference of ± 15.			

QAPP Worksheet #24 (*continued*)
Analytical Instrument Calibration

INSTRUMENT	CALIBRATION PROCEDURE	FREQUENCY OF CALIBRATION	ACCEPTANCE CRITERIA	CORRECTIVE ACTION (CA)	PERSON RESPONSIBLE FOR CA	SOP REFERENCE[1]
Balance	See SOP W-5.	Daily	NA	Inspect system, correct problem, and rerun calibration on affected samples.	Analyst	W-2 and W-5
Spectrophotometer	Construct two 6-point calibration curves of absorbance versus concentration for low and high levels.	Before sample analysis, when check standard is outside Confidence Limits; also, after major instrument maintenance	Initial calibration correlation coefficient >0.995 ICV/CCV 90-110%	Fix problem and recalibrate.	Analyst	W-3

Footnote:
[1] See Analytical SOP References (Worksheet #23).

QAPP Worksheet #25
Analytical Instrument and Equipment Maintenance, Testing, and Inspection

INSTRUMENT/ EQUIPMENT	MAINTENANCE ACTIVITY	TESTING ACTIVITY	INSPECTION ACTIVITY	FREQUENCY	ACCEPTANCE CRITERIA	CORRECTIVE ACTION	RESPONSIBLE PERSON	SOP REFERENCE[1]
GC/ECD	▪ Change septa weekly, or as needed. ▪ Change gas line dryers as needed. ▪ Replace injection port liner weekly, or as needed. ▪ Clip column. ▪ Replace GC column as needed. ▪ Clean/Replace detector as needed. ▪ Provide that gas supply is sufficient and delivery pressure is adequate.	PCBs	Check connections, bake out instrument, and conduct leak test.	W-1 and W-3	W-3 and W-3	Inspect system, correct problem, rerun calibration, and reanalyze affected samples.	Analyst	W-1 and W-4
Spectro-photometer	▪ Dust lamp and front of front lens. ▪ Clean sample compartment. ▪ Clean windows. ▪ Clean cuvettes.	Total phosphorus	Check the zero.	Daily	See W-3.	Inspect system, correct problem, and rerun calibration on affected samples.	Analyst	W-3
Balance	▪ Professional service contract	All	NA	Once/year	NA	NA	Service contractor	NA

Footnote:
[1] See Analytical SOP References (Worksheet #23).

QAPP Worksheet #26
Sample Handling System (WATS)

SAMPLE COLLECTION, PACKAGING, AND SHIPMENT
Sample Collection (personnel/organization): Jennifer Overvoorde, RMT
Sample Packaging (personnel/organization): Jennifer Overvoorde, RMT
Coordination of Shipment (personnel/organization): Jennifer Overvoorde, RMT
Type of Shipment/Carrier: Overnight courier
SAMPLE RECEIPT AND ANALYSIS
Sample Receipt (personnel/organization): Dennis Catalano, WATS (or designee)
Sample Custody and Storage (personnel/organization): Dennis Catalano, WATS (or designee)
Sample Preparation (personnel/organization): Dennis Catalano, WATS (or designee)
Sample Determinative Analysis (personnel/organization): Dennis Catalano, WATS (or designee)
SAMPLE ARCHIVING
Field Sample Storage (number of days from sample collection): 30 days from submittal of final report
Sample Extract/Digestate Storage (number of days from extraction/digestion): 60 days from submittal of final report
Biological Sample Storage (number of days from sample collection): NA
SAMPLE DISPOSAL
Personnel/Organization: Dennis Catalano, WATS
Number of Days from Analysis: 60 days minimum from submittal of final report

QAPP Worksheet #27
Sample Custody Requirements

Field Sample Custody Procedures (sample collection, packaging, shipment, and delivery to laboratory):

- The field sampler is personally responsible for the care and custody of the samples until they are transferred to the laboratory or properly dispatched. Keep the number of people handling the samples to a minimum to ensure proper field Chain-of-Custody.
- Field Chain-of-Custody Records will accompany all analytical samples and sample shipping containers to document their transfer from the field to the analytical laboratory. The procedures to be implemented are as follows:
  - Complete Chain-of-Custody Records Indicating sample identification, containers filled, sampling date, sampling time, sample collector's name, and sample preservation, if applicable. Also note this information in the field notebooks.
  - Repack shipping containers with samples, Chain-of-Custody Records, and water ice. Assign a Chain-of-Custody Record to each set of sample containers to be shipped.
  - Place completed Chain-of-Custody Records in a plastic bag, seal the bag, and tape it to the inside cover of the shipping container. After the samples are iced, add the date to the Chain-of-Custody Record, seal the coolers with strapping tape, add custody seals, and ship the coolers to WATS Laboratory using an overnight delivery service. Identify common carriers or intermediate individuals on the Chain-of-Custody Record, and retain copies of all bills-of-lading. When the samples are received in the laboratory, handle and process them in accordance with laboratory SOPs, or specified analytical methods, as defined in this QAPP.
  - The laboratory receiving the samples will check shipping containers for completeness of paperwork, broken custody seals, damaged sample containers, and sample preservation as specified by the analytical method. The laboratory's sample management staff will note any problems, log the samples into the laboratory, and complete the Chain-of-Custody Record. The person relinquishing the samples to the facility or agency will request the representative's signature acknowledging sample receipt. If the representative is unavailable or refuses, this is to be noted in the "Received By" space on the Record.
  - Include copies of the Chain-of-Custody Record with the analytical data.
- A separate sample receipt is prepared whenever samples are split with a government agency. The receipt is marked to indicate with whom the samples are being split. The person relinquishing the samples to the agency should request the agency representative's signature acknowledging sample receipt. If the representative is unavailable or refuses, this is to be noted on the receipt and in the field notebook.
- A copy of the Chain-of-Custody Record will accompany the samples to the laboratory. The field sampling personnel will retain one copy with the field notes. If a Chain-of-Custody Record Is damaged in shipment, the field copy will be made available. A written statement will be prepared by the person who collected the samples, listing the samples that were recorded on the damaged record, and describing when and how the samples were collected. The statement should include information such as field notebook entries regarding the sample. This statement is submitted to the On-Site Coordinator and the RMT Project Manager for further action, as necessary.

Laboratory Sample Custody Procedures (receipt of samples, archiving, disposal):

The laboratory assigns a unique, sequentially numbered sample code to each sample received. Laboratory custody procedures for sample receiving and log-in, storage, tracking, and holding time requirements are described in the laboratory's Quality Assurance Manual and in the Laboratory SOPs (see Attachment 1-5).

QAPP Worksheet #27 (*continued*)
Sample Custody Requirements

Sample Identification Procedures:

- Label each bottle with the project number, the sample identifier, the sample type, the sampler's initials, and the date and time of sample collection.
- Complete sample labels for each sample and custody seals for each shipment container using waterproof ink, unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample tag because the ink pen would not function in freezing weather.

QAPP Worksheet #27 (*continued*)
Sample Custody Requirements

Chain-of-Custody Procedures:

An example Chain-of-Custody Record from WATS Laboratory is shown in Attachment 1-3. The Records should be legibly completed. Errors will be corrected by drawing a single line through the incorrect information and entering the correct information. All corrections are to be initialed and dated by the person making the correction. This procedure applies to words or figures inserted or added to a previously recorded statement.

The following information must be included on the Chain-of-Custody Record Attachment 1-3:

- Facility name and address, project number, and sampler identification.
- "The Sample ID No. and Description" portion of the Record must be completed for each sample. This information includes the Field Sample ID, sample date and time, and sample depth. The sampling time **MUST** also be noted on the sample bottle (except for blind field duplicates, where date and time would <u>not</u> be noted on the bottle label or Chain-of-Custody Record).
- The sample container type and number, sample matrix, preservative/filtration, and requested analysis must be designated by checking the appropriate box and/or writing the required information.

Sample custody is documented on the lower portion of the Record, and includes the sampler's signature, signatures of persons involved in the possession of the sample with dates and times, and the date on which the sample was received at the laboratory, as described further below.

- ***Relinquished by/Received by*** - This part of the Chain-of-Custody Record is a record of the individuals who actually had the samples in their custody. The spaces must be used in chronological order as the Chain-of-Custody Record is transferred with the samples.
    - (1) Sampler signs when relinquishing custody.
    - (1) Person accepting custody of samples from sampler signs.
    - (2) Person in (1) must sign when relinquishing custody.
    - (2)-(3) These are completed as necessary in the same manner as above.
- ***Sampler*** - The person/persons collecting the samples must <u>sign</u> their name and <u>print</u> their name under their signature, and record the date and time they relinquish the samples to either the laboratory or the shipper. The final signature is that of the person receiving the samples at the laboratory.
- ***Special Instructions*** – The sampler may provide additional information about a sample, *e.g.*, if an odor is present, high or low pH, etc.
- ***Possible Hazard Identification*** – The sampler may include any known <u>or</u> suspected hazards associated with the samples. Sample entry personnel may add information to this section based on communications from the laboratory Project Manager or Supervisor after samples are received. Laboratory Team Leaders will use any hazard information to update and advise their analysts before work is started.

<u>Note</u>: If commercial carriers are used, the name of the carrier, any airbill number, and the date and time of relinquishing the sample containers are written on the airbill by sample entry or field personnel, and the airbill is attached to the Chain-of-Custody Record.

A copy of the Chain-of-Custody Record should be returned with the sample results. The laboratory service request number should be written on the Chain-of-Custody Record to facilitate its use during project data entry.

QAPP Worksheet #28-1
QC Samples - PCBs (Surface Water)

Matrix: Water | Sampling SOP: F-1, F-3 | Field Sampling Organization: RMT

Analytical Group: PCBs | Analytical Method/SOP Reference: W-1 | Analytical Organization: WATS

Concentration Level: All | Sampler's Name: NA | Number of Sample Locations: To be determined[1]

QC SAMPLE	FREQUENCY/ NUMBER	METHOD/SOP QC ACCEPTANCE LIMITS	CORRECTIVE ACTION	PERSON(S) RESPONSIBLE FOR CORRECTIVE ACTION	DATA QUALITY INDICATOR (DQI)	MEASUREMENT PERFORMANCE CRITERIA
Field duplicate	1 per 10 samples	RPD <20	Qualify data as needed.	RMT Data Validator	Precision	RPD
Surrogates	2 per sample	Laboratory control limits	Re-extraction/ Reanalysis	Laboratory staff	Accuracy	% Recovery
Method blanks	1 per analytical batch	< Laboratory reporting limit	Re-extraction/ Reanalysis	Laboratory staff	Bias/Contamination	< Laboratory reporting limit
Equipment blanks	1 per 10 samples	< Laboratory reporting limit	Qualify data as needed.	RMT Data Validator	Bias/Contamination	< Laboratory reporting limit
Laboratory control sample (LCS)	1 per analytical batch	Laboratory control limits	Re-extraction/ Reanalysis	Laboratory staff	Accuracy	% Recovery
MS/MSD	1 per 20 samples	Laboratory control limits	Qualify data as needed.	Laboratory staff RMT Data Validator	Accuracy/Precision	% Recovery/RPD

Footnote:

(1) See project-specific scope and Field Sampling Plan.

QAPP Worksheet #28-2
QC Samples - TSS (Surface Water)

Matrix: Water | Sampling SOP: F-3 | Field Sampling Organization: RMT

Analytical Group: TSS | Analytical Method/SOP Reference: W-2, W5 | Analytical Organization: WATS

Concentration Level: All | Sampler's Name: NA | Number of Sample Locations: To be determined[1]

QC SAMPLE	FREQUENCY/ NUMBER	METHOD/SOP QC ACCEPTANCE LIMITS	CORRECTIVE ACTION	PERSON(S) RESPONSIBLE FOR CORRECTIVE ACTION	DATA QUALITY INDICATOR (DQI)	MEASUREMENT PERFORMANCE CRITERIA
Field duplicate	1 per 10 samples	RPD <20	Qualify data as needed.	RMT Data Validator	Precision	RPD
Method blanks	1 per analytical batch	< Laboratory reporting limit	Re-extraction/ Reanalysis	Laboratory staff	Bias/Contamination	< Laboratory reporting limit
Equipment blanks	1 per 10 samples	< Laboratory reporting limit	Qualify data as needed.	RMT Data Validator	Bias/Contamination	< Laboratory reporting limit
Laboratory control sample (LCS)	1 per analytical batch	Laboratory control limits	Re-extraction/ Reanalysis	Laboratory staff	Accuracy	% Recovery

Footnote:
(1) See project-specific scope and Field Sampling Plan.

QAPP Worksheet #28-3
QC Samples - Phosphorus (Surface Water)

Matrix: Water | Sampling SOP: F-3 | Field Sampling Organization: RMT

Analytical Group: Total phosphorus | Analytical Method/SOP Reference: W-3 | Analytical Organization: WATS

Concentration Level: All | Sampler's Name: NA | Number of Sample Locations: To be determined[1]

QC SAMPLE	FREQUENCY/ NUMBER	METHOD/SOP QC ACCEPTANCE LIMITS	CORRECTIVE ACTION	PERSON(S) RESPONSIBLE FOR CORRECTIVE ACTION	DATA QUALITY INDICATOR (DQI)	MEASUREMENT PERFORMANCE CRITERIA
Field duplicate	1 per 10 samples	RPD <20	Qualify data as needed.	RMT Data Validator	Precision	RPD
Method blanks	1 per analytical batch	< Laboratory reporting limit	Re-extraction/ Reanalysis	Laboratory staff	Bias/Contamination	< Laboratory reporting limit
Equipment blanks	1 per 10 samples	< Laboratory reporting limit	Qualify data as needed.	RMT Data Validator	Bias/Contamination	< Laboratory reporting limit
Laboratory control sample (LCS)	1 per analytical batch	Laboratory control limits	Re-extraction/ Reanalysis	Laboratory staff	Accuracy	% Recovery
MS/MSD	1 per 20 samples	Laboratory control limits	Qualify data as needed.	Laboratory staff RMT Data Validator	Accuracy/Precision	% Recovery/RPD

Footnote:

(1) See project-specific scope and Field Sampling Plan.

QAPP Worksheet #28-4
QC Samples - PCBs (Soil/Sediment)

Matrix: Soil/Sediment
Sampling SOP: F-4
Field Sampling Organization: RMT
Analytical Group: PCBs
Analytical Method/SOP Reference: W-4
Analytical Organization: WATS
Concentration Level: All
Sampler's Name: NA
Number of Sample Locations: To be determined[1]

QC SAMPLE	FREQUENCY/ NUMBER	METHOD/SOP QC ACCEPTANCE LIMITS	CORRECTIVE ACTION	PERSON(S) RESPONSIBLE FOR CORRECTIVE ACTION	DATA QUALITY INDICATOR (DQI)	MEASUREMENT PERFORMANCE CRITERIA
Field duplicate	1 per 10 samples	RPD <50	Qualify data as needed.	RMT Data Validator	Precision	RPD
Surrogates	2 per sample	Laboratory control limits	Re-extraction/ Reanalysis	Laboratory staff	Accuracy	% Recovery
Method blanks	1 per analytical batch	< Laboratory reporting limit	Re-extraction/ Reanalysis	Laboratory staff	Bias/Contamination	< Laboratory reporting limit
Equipment blanks	1 per 10 samples	< Laboratory reporting limit	Qualify data as needed.	RMT Data Validator	Bias/Contamination	< Laboratory reporting limit
Laboratory control sample (LCS)	1 per analytical batch	Laboratory control limits	Re-extraction/ Reanalysis	Laboratory staff	Accuracy	% Recovery
MS/MSD	1 per 20 samples	Laboratory control limits	Qualify data as needed.	Laboratory staff RMT Data Validator	Accuracy/Precision	% Recovery/RPD

Footnote:
(1) See project-specific scope and Field Sampling Plan.

QAPP Worksheet #29
Project Documents and Records

SAMPLE COLLECTION DOCUMENTS AND RECORDS	ON-SITE ANALYSIS DOCUMENTS AND RECORDS	OFF-SITE ANALYSIS DOCUMENTS AND RECORDS	DATA ASSESSMENT DOCUMENTS AND RECORDS	OTHER
▪ Field notes ▪ Sampling logs ▪ Chain-of-Custody Records ▪ Air bills ▪ Custody seals	▪ Equipment calibration logs ▪ Field data records ▪ Field instrument maintenance logs	▪ Sample receipt, custody, and tracking records ▪ Standard traceability logs ▪ Equipment calibration logs ▪ Sample prep logs ▪ Run logs ▪ Equipment maintenance, testing, and inspection logs ▪ Corrective action forms ▪ Reported field sample results ▪ Reported results for standards, QC checks, and QC samples ▪ Instrument printouts (raw data) for field sample standards, QC checks, and QC sample ▪ Data package completeness checklists ▪ Sample disposal records ▪ Extraction/Cleanup records ▪ Raw data (stored on diskette or CD-R) ▪ Analytical reports	▪ Data validation checklists ▪ Data quality assessments	▪ Consent Decree documents ▪ Progress reports to the U.S. EPA ▪ Work plans and Field Sampling Plans ▪ Health and Safety Plans ▪ Quality Assurance Project Plan ▪ Quality Management Plan ▪ Remedial Investigation and Risk Assessment Reports ▪ Feasibility Studies ▪ Design Reports ▪ Construction Documentation Reports ▪ Monitoring Reports

QAPP Worksheet #30
Analytical Services

MATRIX	ANALYTICAL GROUP	CONCENTRATION LEVEL	SAMPLE LOCATIONS/ ID NUMBERS	ANALYTICAL SOP	DATA PACKAGE TURNAROUND TIME	LABORATORY/ ORGANIZATION (name, address, contact person, and telephone number)	BACKUP LABORATORY/ ORGANIZATION (name, address, contact person, and telephone number)
Surface water	PCBs, TSS, total phosphorus	All	TBD	W-1, W-2, W-3, W-5	Standard turnaround time (17 calendar days)	Weyerhaeuser Analysis and Testing Services (WATS) Weyerhaeuser Company Mail Stop: WTC2F25 32901 Weyerhaeuser Way Federal Way, WA 98001 Dennis Catalano 253.924.6242	Pace Analytical Services, Inc., Wisconsin 1700 Elm Street, SE Suite 200 Minneapolis, MN 55414 Tod Noltenmeyer (608) 232-3300
Soil/ Sediment	PCBs	All	TBD	W-4	Rush turnaround time (7 calendar days)	Weyerhaeuser Analysis and Testing Services (WATS) Weyerhaeuser Company Mail Stop: WTC2F25 32901 Weyerhaeuser Way Federal Way, WA 98001 Dennis Catalano 253.924.6242	Pace Analytical Services, Inc., Wisconsin 1700 Elm Street, SE Suite 200 Minneapolis, MN 55414 Tod Noltenmeyer (608) 232-3300
Third-Party Data Validation	All	All	--	All	--	Environmental Chemistry Consulting Services, Inc. (ECCS) 2525 Advance Road Madison, WI 53718 Greg Graf 608.221.8700	--

Notes:
NA = not applicable.
TBD = to be determined.

QAPP Worksheet #31-1
Planned Project Assessments
(Emergency Response Activities)

ASSESSMENT TYPE	FREQUENCY	INTERNAL OR EXTERNAL	ORGANIZATION PERFORMING ASSESSMENT	PERSON(S) RESPONSIBLE FOR PERFORMING ASSESSMENT (title and organizational affiliation)	PERSON(S) RESPONSIBLE FOR RESPONDING TO ASSESSMENT FINDINGS (title and organizational affiliation)	PERSON(S) RESPONSIBLE FOR IDENTIFYING AND IMPLEMENTING CORRECTIVE ACTIONS (CA) (title and organizational affiliation)	PERSON(S) RESPONSIBLE FOR MONITORING EFFECTIVENESS OF CA (title and organizational affiliation)
Field performance audit	Periodic, based on field schedule	Internal	RMT	Kathy Huibregtse, RMT (Senior Consultant, QA Manager)	Jim Hutchens, RMT (Project Coordinator)	Jennifer Overvoorde, RMT (Field Sampling Coordinator), and Jeff Macri (Construction Manager)	Jim Hutchens, RMT (Project Coordinator)
Field systems audit	Periodic, based on field schedule	Internal	RMT	Tom Stolzenburg, RMT (Data QA Manager)	Jim Hutchens, RMT (Project Coordinator)	Jennifer Overvoorde, RMT (Field Sampling Coordinator), and Jeff Macri (Construction Manager)	Jim Hutchens, RMT (Project Coordinator)
Laboratory audit	As needed, based on laboratory performance	External	RMT	Tom Stolzenburg, RMT (Data QA Manager)	Dennis Catalano, WATS (Laboratory QA/QC Manager)	Dennis Catalano, WATS (Laboratory QA/QC Manager)	Tom Stolzenburg, RMT (Data QA Manager)
Laboratory audit	Per laboratory QA Plan	Internal	WATS	Dennis Catalano, WATS (Laboratory QA/QC Manager)	Dennis Catalano, WATS (Laboratory QA/QC Manager)	Dennis Catalano, WATS (Laboratory QA/QC Manager)	Tom Stolzenburg, RMT (Data QA Manager)

QAPP Worksheet #31-2
Planned Project Assessments
(Predesign Investigations For the Remedial Design For the 12Th Street Landfill)

ASSESSMENT TYPE	FREQUENCY	INTERNAL OR EXTERNAL	ORGANIZATION PERFORMING ASSESSMENT	PERSON(S) RESPONSIBLE FOR PERFORMING ASSESSMENT (title and organizational affiliation)	PERSON(S) RESPONSIBLE FOR RESPONDING TO ASSESSMENT FINDINGS (title and organizational affiliation)	PERSON(S) RESPONSIBLE FOR IDENTIFYING AND IMPLEMENTING CORRECTIVE ACTIONS (CA) (title and organizational affiliation)	PERSON(S) RESPONSIBLE FOR MONITORING EFFECTIVENESS OF CA (title and organizational affiliation)
Field performance audit	Periodic, based on field schedule	Internal	RMT	Kathy Huibregtse, RMT (Senior Consultant, QA Manager)	Linda Hicken, RMT (Project Coordinator)	Jennifer Overvoorde, RMT (Field Sampling Coordinator)	Linda Hicken, RMT (Project Coordinator)
Field systems audit	Periodic, based on field schedule	Internal	RMT	Tom Stolzenburg, RMT (Data QA Manager)	Linda Hicken, RMT (Project Coordinator)	Jennifer Overvoorde, RMT (Field Sampling Coordinator)	Linda Hicken, RMT (Project Coordinator)

QAPP Worksheet #32-1
Assessment Findings and Corrective Action Responses
(Emergency Response Activities)

ASSESSMENT TYPE	NATURE OF DEFICIENCIES DOCUMENTATION	INDIVIDUAL(S) NOTIFIED OF FINDINGS (name, title, organization)	TIME FRAME OF NOTIFICATION	NATURE OF CORRECTIVE ACTION RESPONSE DOCUMENTATION	INDIVIDUAL(S) RECEIVING CORRECTIVE ACTION RESPONSE (name, title, organization)	TIME FRAME FOR RESPONSE
Field performance audit	Checklist	Kathy Huibregtse, RMT (Senior Consultant QA Manager), will notify Jim Hutchens, RMT (Project Coordinator).	Within 72 hours after audit (or sooner, as appropriate)	E-mail response	Jennifer Overvoorde, RMT (Field Sampling Coordinator), and Jeff Macri (Construction Manager)	Within 48 hours after notification (or sooner, as appropriate)
Field systems audit	Checklist	Tom Stolzenburg, RMT (Data QA Manager), will notify Jim Hutchens, RMT (Project Coordinator).	Within 48 hours after audit (or sooner, as appropriate)	E-mail response	Jennifer Overvoorde, RMT (Field Sampling Coordinator), and Jeff Macri (Construction Manager)	Within 48 hours after notification (or sooner, as appropriate)
Internal laboratory audit	Executive Summary from Management Report	Dennis Catalano, WATS (Laboratory QA/QC Manager), will notify Tom Stolzenburg, RMT (Data QA Manager), and appropriate laboratory staff.	Within 48 hours after audit (or sooner, as appropriate)	Executive Summary from Management Report	Greg Graf, RMT (Data QA Manager), and appropriate laboratory staff	Within 48 hours after notification (or sooner, as appropriate)
External laboratory audit	Checklist	Tom Stolzenburg, RMT (Data QA Manager), will notify Dennis Catalano, WATS (Laboratory QA/QC Manager), and Jim Hutchens (Project Coordinator).	Within 1 week after audit	Memorandum	Dennis Catalano, WATS (Laboratory QA/QC Manager)	Within 48 hours after notification (or sooner, as appropriate)

QAPP Worksheet #32-2
Assessment Findings and Corrective Action Responses
(Predesign Investigations For The Remedial Design For the 12th Street Landfill)

ASSESSMENT TYPE	NATURE OF DEFICIENCIES DOCUMENTATION	INDIVIDUAL(S) NOTIFIED OF FINDINGS (name, title, organization)	TIME FRAME OF NOTIFICATION	NATURE OF CORRECTIVE ACTION RESPONSE DOCUMENTATION	INDIVIDUAL(S) RECEIVING CORRECTIVE ACTION RESPONSE (name, title, organization)	TIME FRAME FOR RESPONSE
Field performance audit	Checklist	Kathy Huibregtse, RMT (Senior Consultant QA Manager), will notify Linda Hicken, RMT (Project Coordinator).	Within 72 hours after audit (or sooner, as appropriate)	E-mail response	Jennifer Overvoorde, RMT (Field Sampling Coordinator),	Within 48 hours after notification (or sooner, as appropriate)
Field systems audit	Checklist	Tom Stolzenburg, RMT (Data QA Manager), will notify Linda Hicken, RMT (Project Coordinator).	Within 48 hours after audit (or sooner, as appropriate)	E-mail response	Jennifer Overvoorde, RMT (Field Sampling Coordinator)	Within 48 hours after notification (or sooner, as appropriate)

QAPP Worksheet #33
QA Management Reports

TYPE OF REPORT	FREQUENCY (daily, weekly, monthly, quarterly, annually, etc.)	PROJECTED DELIVERY DATE(S)	PERSON(S) RESPONSIBLE FOR REPORT PREPARATION (title and organizational affiliation)	REPORT RECIPIENT(S) (title and organizational affiliation)
Field audit reports	As needed	As generated	Kathy Huibregtse, Senior Consultant and QA Manager, and Tom Stolzenburg, Data QA Manager	Jennifer Hale, Weyerhaeuser Company Jim Hutchens, RMT, Linda Hicken, RMT
WATS audit (external)	As needed	As generated	Tom Stolzenburg, Data QA Manager	Jennifer Hale, Weyerhaeuser Company Jim Hutchens, RMT, Linda Hicken, RMT
Data validation reports	As specified in data assessment section	As generated	Greg Graf, ECCS (third-party data validator)	Jennifer Hale, Weyerhaeuser Company Jim Hutchens, RMT, Linda Hicken, RMT
Data quality summary	As appropriate for data use	As generated	Greg Graf, ECCS (third-party data validator)	Jennifer Hale, Weyerhaeuser Company Jim Hutchens, RMT, Linda Hicken, RMT

QAPP Worksheet #34
Verification (Step I) Process

VERIFICATION INPUT	DESCRIPTION	INTERNAL/ EXTERNAL	RESPONSIBLE FOR VERIFICATION (name, organization)
Chain-of-Custody Records and shipping documentation	Chain-of-Custody Records and shipping documentation will be reviewed by the laboratory upon receipt of samples for verification against the sample coolers they represent. The Chain-of-Custody Record will be signed by all parties who had custody of samples, with the exception of commercial carriers.	Internal	Dennis Catalano, WATS (or designee)
Field notes and sampling logs	All field notes and sampling logs will be reviewed internally and placed in the project file.	Internal	Jennifer Overvoorde, RMT
Laboratory data	All laboratory data packages will be verified internally by the laboratory performing the work for completeness and technical accuracy prior to submittal.	Internal	Dennis Catalano, WATS
Laboratory data	All final data packages will be verified for content upon receipt.	External	Greg Graf, ECCS (third-party data validator)

QAPP Worksheet #35
Validation (Step I) Process

STEP IIa/IIb	VALIDATION INPUT	DESCRIPTION	RESPONSIBLE FOR VERIFICATION (Name, Organization)
Step IIa	Sampling methods and procedures	Verify that the required analytical methods were used and that any deviations were noted.	Greg Graf, ECCS
Step IIa	Analytical methods	Verify that the required sampling methods were used and that any deviations were noted. The laboratory will verify that QC samples met the performance criteria, and that any deviations were noted on the sample narrative.	Dennis Catalano, WATS Greg Graf, RMT
Step IIb	Documentation of QAPP QC sample results	Establish that all QC samples required by the QAPP were collected and analyzed.	Greg Graf, ECCS
Step IIb	Project Quantitation Limits	Determine that the QAPP-required Quantitation Limits were achieved.	Greg Graf, ECCS
Step IIb	Validation report	Summarize data findings of verification and validation components included in the QAPP. Include comments on any qualified data, and define all qualifiers.	Greg Graf, ECCS

QAPP Worksheet #36
Validation (Steps IIa and IIb) Summary

STEPS IIa AND IIb	MATRIX	ANALYTICAL GROUP	DATA PURPOSE	CONCENTRATION LEVEL	VALIDATION CRITERIA	DATA VALIDATOR (title and organizational affiliation)
IIa and IIb	Aqueous/ Soil/ Sediment	PCBs	Confirmation of remediation	Low, medium, high	U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999), method criteria, QAPP criteria; and professional judgment	Greg Graf (ECCS)
IIa and IIb	Aqueous/ Soil/ Sediment	General chemistry parameters	Confirmation of remediation	Low, medium, high	U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (October 1999), method criteria, QAPP criteria; and professional judgment	Greg Graf (ECCS)

QAPP Worksheet #37
Usability Assessment

Identify the personnel responsible for performing the usability assessment:

Environmental Chemistry Consulting Services, Inc. (ECCS), will perform the usability assessment for analytical data. Greg Graf is responsible for data validation at ECCS. The RMT Field Coordinator Is responsible for verification of field activities.

The RMT Project Manager, Project Scientists, and Laboratory Coordinator will determine if field and analytical data or datasets meet the requirements necessary for decision-making. The results of these measurements will be compared with the DQO requirements set forth in this QAPP. As data are evaluated, anomalies in the data or data gaps may become apparent to the data users. The DQOs will be satisfied if the data are sufficient (based on the quality and completeness of the data) to meet the project objectives.

Data that do not meet the data users' needs (if any) will be identified and appropriately qualified in the project database so that the decision-makers are aware of the limitations.

Summarize the usability assessment process and all procedures, including interim steps and any statistics, equations, and computer algorithms that will be used:

The Data Reviewer will review field notes and field Chain-of-Custody Records to determine that procedures specified in the FSP have been followed.

The RMT Laboratory Coordinator or designated Data Reviewer will conduct a systematic review of the data for compliance with the established QC criteria based on the spike, duplicate, and blank results provided by the laboratory. Data validation will determine whether the procedures specified in the FSP and in this QAPP were implemented, the DQOs specified in this QAPP were attained, the specified Quantitation Limits were achieved, and the sample holding times were met. An evaluation of data accuracy, precision, sensitivity, and completeness, based on method-specific criteria, will be performed according to the following guidance documents:

- National Functional Guidelines for Organic Data Review (U.S. EPA, 1999).

Method specifications provided in the U.S. EPA-approved methods and laboratory SOPs will be used as a guide for validating data obtained for all analytes listed in this QAPP.

All forms will be checked. All raw data, including chromatograms, quantitation reports, data system printouts, and mass spectra for samples, standards, performance evaluation mixtures, blanks, and laboratory spikes/laboratory duplicates or MS/MSDs will be reviewed. A portion (~10 percent) of calculations such as spike recoveries, calibration response factors, analyte quantitation, etc., will be randomly spot-checked.

QAPP Worksheet #37
Usability Assessment

The procedures used to evaluate data include the following:

- All technical holding times will be checked for inorganic and organic analyses.
- Instrument performance check sample results, and initial and continuing calibration results, will be evaluated.
- Data for all blanks, surrogate spikes, matrix spikes/matrix spike duplicates, laboratory control samples, cleanup standards, internal and external standards, target compound identification and quantitation, and system performance checks will be reviewed.
- Sample calculations will be checked.
- Field precision will be determined from blind field duplicate data.
- Completeness of the data package will be checked to determine if all samples and analyses required by the QAPP were processed, that the procedures specified in the QAPP were implemented, and that all deliverables specified in the QAPP are included.
- The Data Reviewer will identify any out-of-control data points and data omissions, and will interact with the laboratory to correct data deficiencies.
- Decisions to repeat sample collection and analyses may be made by the RMT Project Manager based on the extent of the deficiencies and their importance in the overall context of the project.
- The third-party data reviewer will assess the usability of results against the DQOs.

QAPP Worksheet #37 (*continued*)
Usability Assessment

Describe the evaluative procedures used to assess overall measurement error associated with the project:

The data quality indicator (DQIs) used to evaluate conformance with the project DQOs are presented below.

DQIs are generally defined in terms of the following six parameters;

1. Representativeness
2. Comparability
3. Completeness
4. Precision
5. Accuracy
6. Sensitivity

Each parameter is defined below. Specific objectives for the site actions are presented in other sections of this QAPP, as referenced below.

Representativeness

Representativeness is the degree to which sampling data accurately and precisely represent site conditions, and is dependent on sampling and analytical variability and the variability of environmental media at the site. Actions have been designed to assess the presence of chemical constituents at the time of sampling. The QAPP presents the rationale for sample quantities and location. This QAPP presents field sampling and laboratory analytical methodologies. Use of the prescribed field and laboratory analytical methods with associated holding times and preservation requirements is intended to provide representative data.

Comparability

Comparability is the degree of confidence with which one data set can be compared with another. Comparability between phases of the actions (if additional phases are required) will be maintained through consistent use of the sampling and analytical methodologies set forth in the QAPP, the established QA/QC procedures, and the use of appropriately trained personnel.

Completeness

Completeness is defined as a measure of the amount of valid data obtained from an event and/or investigation compared to the total amount that was obtained. This will be determined upon final assessment of the analytical results. Completeness of a field or laboratory data set will be calculated by comparing the number of valid sample results generated with the total number of results generated.

$$\text{Completeness} = \frac{\text{Number valid results}}{\text{Total number of results generated}} \times 100$$

As a general guideline, overall project completeness is expected to be at least 90 percent. The assessment of completeness will require professional judgment to determine data usability for intended purposes.

QAPP Worksheet #37 (*continued*)
Usability Assessment

Precision

Precision is a measure of the reproducibility of sample results. The goal is to maintain a level of analytical precision consistent with the objectives of the action. To maximize precision, sampling and analytical procedures will be followed. All work for the site actions will adhere to the established protocols presented in the QAPP. Checks for analytical precision will include the analysis of MS/MSDs, laboratory duplicates, and field duplicates. Checks for field measurement precision will include duplicate field measurements.

The precision of data will be measured by calculating the Relative Percent Difference (RPD) by the following equation:

$$RPD = \frac{(A-B)}{(A+B)/2} \times 100,$$

where

A = analytical result from one of two duplicate measurements,
B = analytical result from the second measurement.

Accuracy

Accuracy is a measure of how close a measured result is to the true value. Both field and analytical accuracy will be monitored through initial and continuing calibration of instruments. In addition, reference standards, MSs, blank spikes, and surrogate standards will be used to assess the accuracy of the analytical data.

Accuracy will be calculated in terms of percent recovery as follows:

$$\%\ Recovery = \frac{A-X}{B} \times 100,$$

where

A = value measured in spiked sample or standard,

X = value measured in original sample,

B = true value of amount added to sample or true value of standard.

Sensitivity

Sensitivity is a quantitative measurement to determine if the analytical laboratory's procedures/methodologies and their associated MDLs can satisfy the project requirements as they relate to the project action limits. MDLs are updated annually by the laboratory.

QAPP Worksheet #37 (*continued*)
Usability Assessment

Describe the documentation that will be generated during usability assessment and how usability assessment results will be presented so that they identify trends, relationships (correlations), and anomalies:
The data validation report will address the following items: ▪ Overall quality and usability of the data ▪ Evaluation of QC data, including precision, accuracy, and completeness of the data ▪ Potential sample contamination due to blank contributions ▪ Assessment of laboratory and field records ▪ Actions regarding specific QC criteria exceedences Laboratory-applied data qualifiers will be defined within the analytical data package received from the laboratory. The sample narrative will also detail quality control issues identified by the laboratory. Data validation qualifiers that may be applied to the data include the following: U The analyte/compound was analyzed for, but not detected. The associated value is the compound's Limit of Quantitation. UJ The compound was not detected above the reported sample's Limit of Quantitation. However, the reported limit is approximate and may or may not represent the actual Limit of Quantitation. J The compound was positively identified; however, the associated numerical value is an estimated concentration only. R The sample results are rejected.

Attachment 1-1
Laboratory Accuracy and Precision Objectives

Table 1-1
Laboratory Accuracy and Precision Objectives
Multi-Area QAPP
Weyerhaeuser Company
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

ANALYTE	LCS/MATRIX SPIKE RECOVERY (% water)	LCS/MATRIX SPIKE RECOVERY (% soil)	RPD (% water)	RPD (% soil)
Aroclor-1016	80-120	80-120	0-20	0-40
Aroclor-1260	80-120	80-120	0-20	0-40
Total phosphorus	75-125	--	0-20	--
TSS	*/NA	NA	0-20	--

Notes:
*TSS control limits shall meet the manufacturer's control limits for that specific sample.
NA = not applicable.

Attachment 1-2
PCB Surrogate Compound Recovery Limits

Table 1-2
PCB Surrogate Compound Recovery Limits
Multi-Area QAPP
Weyerhaeuser Company
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

COMPOUND	% RECOVERY (water)	% RECOVERY (soil)
Tetrachloro-m-xylene	60-120	60-120
Decachlorobiphenyl	60-120	60-120

Attachment 1-3
Sample Chain-of-Custody Record

Attachment 1-4
Laboratory Quality Assurance Manual

Attachment 1-5
Laboratory SOPs

Sections in Analytical SOPs

1. Scope
2. Summary of Method
3. Interferences
4. Estimate of Analytical Time
5. Amount of Sample Required
6. Sampling, Sample Handling, and Preservation
7. Equipment Required
8. Reagents (if applicable)
9. Procedure
10. Quality Control
11. Report
12. Key Words
13. References

WATS SOPs

- W-1
- W-2
- W-3
- W-4
- W-5
- Sample Management
- General Procedures

W-1

W-2

W-3

W-4

W-5

Sample Management

General Procedures

Pace SOPs

- Extraction of PCBs Using the Automated Soxhlet
- Separatory Funnel Extraction of Water Samples for Semivolatile Analysis and Green Bay Addendum
- Analysis of Polychlorinated Biphenyls by Gas Chromatography
- Total Phosphorus Using Block Digestion and Analyzed by Lachat 8000 Flow Injection
- Measurement of Volatile Solids and Solids in Waters

Attachment 1-6
Laboratory Policies and Guidelines

Appendix B
Multi-Area Field Sampling Plan - Revision 2

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Telephone (608) 831-4444
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Multi-Area Field Sampling Plan

Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site Plainwell, Michigan

Revision 2
February 2008

Prepared by
RMT, Inc.
on behalf of Weyerhaeuser Company

1/96

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Appendix B	Example Forms/Logs

Acronyms and Abbreviations

μg/L	micrograms per liter
μg/kg	micrograms per kilogram
AA	atomic absorption
ARAR	Applicable Relevant and Appropriate Requirements
ASTM	American Society for Testing and Materials
BFB	p-bromofluorobenzene
BNA	base-neutral-acid extractables
CCB	continuing calibration blank
CCC	calibration check compound
CCV	continuing calibration verification
CD	Consent Decree
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
COC	Chain-of-Custody
COPC	constituent of potential concern
CVAA	cold vapor atomic absorption
DFTPP	decafluorotriphenylphosphine
DI	deionized
DO	dissolved oxygen
DQI	data quality indicators
DQO	Data Quality Objective
ECD	electron capture detector
EDD	electronic data deliverable
Eh	redox
FB	field blank
FS	Feasibility Study
FSP	Field Sampling Plan
GC/MS	gas chromatograph/mass spectrophotometer
HSP	Health and Safety Plan
ICB	initial calibration blank

ICP	inductively coupled plasma
ICPMS	inductively coupled plasma mass spectroscopy
ICS	interface check samples
ICV	initial calibration verification
IDW	investigation-derived waste
kg	kilogram
KRSG	Kalamazoo River Study Group
L	liter
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LRA	linear range analysis
MDEQ	Michigan Department of Environmental Quality
MDL	Method Detection Limit
MS	matrix spike
MS/MSD	matrix spike/matrix spike duplicate
MSD	matrix spike duplicate
NCP	National Contingency Plan
NIST	National Institute of Standards and Technology
NTU	nephelometric turbidity unit
OSC	On-Site Coordinator
PAH	polycyclic aromatic hydrocarbon
PCB	polychlorinated biphenyl
pH	negative logarithm (base 10) of hydrogen ion activity
PID	photoionization detector
PQO	Project Quality Objective
POTW	publicly-owned treatment works
PM	Project Manager
QA	quality assurance
QA/QC	quality assurance/quality control
QAPP	Quality Assurance Project Plan
QC	quality control
QL	Quantitation Limit
RASs	routine analytical services
RD/RA	Remedial Design/Remedial Action

RF	response factor
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPD	relative percent difference
RL	reporting limit
RPM	Remedial Project Manager
RSD	relative standard deviation
RT	retention time
SAP	Sampling and Analysis Plan
SAS	special analytical services
SOP	standard operating procedure
SOW	Statement of Work
SPCC	system performance check compound
SRI/FS	Supplemental Remedial Investigation/Feasibility Study
SRM	standard reference material
SW846	Test Methods for Evaluating Solid Waste, 1996
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leaching Procedure
TCRA	Time-Critical Removal Action
TEMP	temperature
TB	trip blank
TSS	Total suspended solids
U.S. EPA	United States Environmental Protection Agency
VOC	volatile organic compound
WATS	Weyerhaeuser Analytical Testing Services

Section 1 Introduction

1.1 Background

Weyerhaeuser Company (Weyerhaeuser) was identified as a Potentially Responsible Party (PRP) for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site (Site) in a General Notice letter dated April 8, 2004, that was received by Weyerhaeuser and two other PRPs. Concurrently, Weyerhaeuser was negotiating a Consent Decree (CD) to undertake specific activities on the former Plainwell Mill and 12th Street Landfill sites. On February 22, 2005, Weyerhaeuser entered into a CD with the United States Environmental Protection Agency (U.S. EPA), for the Design and Implementation of Certain Response Activities at the 12th Street Landfill site (Operable Unit No. 4) and the Plainwell Mill site (Operable Unit No. 7). Both sites are part of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site (Figure 1-1), which is located in southwestern Michigan. A Statement of Work (SOW) for the Remedial Design/Remedial Action (RD/RA) at the 12th Street Landfill site was attached to the CD. An SOW for the Remedial Investigation/Feasibility Study (RI/FS) at the Plainwell Mill site was subsequently issued by the U.S. EPA, with an effective date of August 17, 2006.

The U.S. EPA requires that all parties involved in environmental monitoring and measurement efforts mandated or supported by the U.S. EPA participate in a centrally managed quality assurance program. Any party generating data under this program has the responsibility to implement minimum procedures to ensure that the precision, accuracy, completeness, and representativeness of the data are known and documented. To ensure that the responsibility is met uniformly, a written Quality Assurance Project Plan (QAPP) and associated Field Sampling Plan (FSP) must be prepared for each project. A Multi-Area QAPP for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site has been submitted for review under separate cover. It has been prepared to support field activities by describing specific protocols that will be followed for sampling, sample handling and storage, chain-of-custody procedures, and laboratory analysis for multiple areas of the Site. The Multi-Area QAPP also defines objectives, organization, functional activities, and specific quality assurance (QA) and quality control (QC) activities associated with implementing the following activities:

1. Emergency Response in the former powerhouse discharge channel at the 12th Street Landfill
2. Emergency Response of portions of the riverbank along the Plainwell Mill
3. Predesign investigations for the remedial design for the 12th Street Landfill

QAPP amendments will be submitted to supplement the current QAPP as additional work activities are authorized and defined.

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This associated Multi-Area FSP establishes sample collection and field monitoring methods and procedures to be followed to ensure that sampling and investigatory activities at the Site are conducted in a consistent manner and in accordance with technically acceptable protocols. The objective of the FSP is to facilitate the collection of environmental monitoring data that meet Data Quality Objectives (DQOs) established in the Multi-Area QAPP (RMT, 2008a). This FSP will be modified in the future as other sampling programs are developed for Operable Units 04 and 07, as well as other areas of the site, as appropriate.

1.2 Document Organization

This FSP was prepared to establish Standard Operating Procedures (SOPs) for environmental monitoring activities expected or likely to be conducted for purposes of completing activities associated with the following activities:

1. Emergency Response in the former powerhouse discharge channel at the 12th Street Landfill
2. Emergency Response of portions of the riverbank along the Plainwell Mill
3. Predesign investigations for the remedial design for the 12th Street Landfill

Additional SOPs will be submitted as work areas are added or work tasks are modified. SOPs developed as components of amended scope documents will become common to all sampling activities of the same type (*e.g.,* sediment core collection).

As additional workplans are prepared, it is anticipated that they will be incorporated as additional addenda to this document, referencing a combination of the same SOPs, amended SOPs, or additional SOPs. If additional SOPs are required, they will be added to Appendix A. If modified SOPs are required, they will replace existing SOPs in this document. Specific addenda will be provided as standalone documents.

1.3 Project Setting

The 12th Street Landfill and Plainwell Mill sites are located in Allegan County, Michigan (Figure 1-2). The 12th Street Landfill is located in Otsego Township (Section 24, Township 1N, Range 12W), and the Plainwell Mill is located in the City of Plainwell (Section 30, Township 1N, Range 11W). Both sites are located adjacent to the Kalamazoo River, with the 12th Street Landfill located approximately 1½ miles northwest and downstream of the Plainwell Mill site. The 12th Street Landfill site is composed of approximately 6.5 acres and is situated on roughly a 24-acre property that is bordered to the east by woodlands and a former hydroelectric powerhouse discharge channel on the Kalamazoo River, to the north and west by wetlands, to the south and southwest by a gravel mining operation, and to the south and southeast by industrially developed lands and the Plainwell Dam (which is scheduled to be removed as part of the U.S. EPA-approved TCRA in 2007-2008). The Plainwell Mill site covers approximately 36 acres and is bordered by the Kalamazoo River to the north (to the top of the riverbank, as defined in the CD), the Plainwell central business district to the east, residential properties to the south, and commercial properties and the City of Plainwell wastewater treatment plant to the west.

Plainwell, Inc., is the current owner of the 12th Street Landfill property, although Plainwell, Inc., is a bankrupt entity with no ongoing business operations. Weyerhaeuser is currently in negotiations with Plainwell, Inc., to take ownership of the 12th Street Landfill property. The City of Plainwell is the current owner of the Plainwell Mill property, having purchased the mill site out of the Plainwell bankruptcy in 2006. The mill property has been vacant since the former Simpson Plainwell Paper Company filed for bankruptcy in 2000. Weyerhaeuser owned and operated the mill for approximately a 9-year period, between 1961 and 1970. During that period, dewatered sludge from wastewater treatment operations was excavated from lagoons on the mill property and transported for disposal at the 12th Street Landfill site.

1.4 Applicability of the FSP

This FSP is applicable for work performed by Weyerhaeuser under its 2005 CD with the U.S. EPA and for other specified work in areas to be determined. The FSP addresses specific projects at Operable Units at the Site, as well as other projects as may be specified later. The applicable operable units are as follows:

- Operable Unit No. 4 – 12th Street Landfill site
- Operable Unit No. 5 – Kalamazoo River
- Operable Unit No. 7 – Plainwell Mill site

The organization and specific QA/QC activities associated with the various data collection activities are presented in the Multi-Area QAPP, which was submitted under separate cover.

This FSP has been developed in general accordance with the U.S. EPA's document entitled, "Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA," dated October 1988.

1.5 Scope and Description of Revision Process

This FSP provides guidance for the various fieldwork activities by defining the sampling and data-gathering methods to be used. The scope of the document is outlined as follows:

- Section 1 provides the introduction, purpose, and scope of the FSP.
- Section 2 describes a summary of the sampling program, including sample locations and frequency.
- Section 3 covers the logistics of sample designation and field records.
- Section 4 summarizes the sample handling and analysis procedures to be followed. Details regarding the sample analytical procedures are discussed in the QAPP.
- Section 5 describes field physical measurements.
- Section 6 describes the management of investigation-derived waste.

As new projects are initiated, new information will be added to this Multi-Area FSP to cover the new project and additional revisions will made, as needed. A new revision number will also be assigned to the document (e.g., Revision 02 will be revised to Revision 03, and so on). Specifically, the following additions/revisions will be made:

- **Summary of Sampling Program -** A subsection will be added to Section 2, to provide a summary of the sampling program. In addition, a new table will be added in Section 2 to provide a summary of the sample types and locations for the new project. The subsections and tables in the previous version of Section 2, which describe previous projects conducted under this Multi-Area FSP, will not be revised or deleted.
- **Other Text Sections** – New information will be added to other sections of the Multi-Area FSP, as necessary to cover the new activities. Information pertaining to previous projects will not be revised or deleted.
- **Standard Operating Procedures (Appendix A) -** If the previously developed Standard Operating Procedures (SOPs), which are included in Appendix A of the Multi-Area FSP, do not cover the sampling procedures that will be utilized for the new project, new SOPs will be added to Appendix A, as necessary. The SOPs that were included for previous projects will not be deleted. SOP revisions will only be made if necessary to update standard sampling procedures or protocols, and if revised, the revision number and date (located in the upper right-hand corner) will be modified as appropriate.
- **Example Forms/Logs (Appendix B) -** If the previously developed sampling forms, which are included in Appendix B of the Multi-Area FSP, do not include forms that will be utilized for the project, new sampling forms will be added to Appendix B, as necessary.
- **QAPP Worksheets (Appendix C)** – New and revised worksheets from the Multi-Area QAPP will be added to Appendix C of the Multi-Area FSP, as needed to provide the appropriate references.

Section 2
Summary of Sampling Program

2.1 Overview

Environmental sampling for the various activities associated with OU-4, OU-5, and OU-7 will include sampling of various media to meet a range of information needs. These information needs will vary depending upon the specific tasks being conducted. At a minimum, this Multi-Area FSP will be used to support the following work activities:

- Operable Unit 04 – Emergency response to TCRA activities in the former powerhouse discharge channel and RD/RA activities defined in the CD and SOW
- Operable Unit 05 – Emergency response to TCRA activities on portions of the riverbank along the Plainwell Mill
- Operable Unit 07 – RI/FS and RD/RA activities defined in the CD and SOW

The subsections below provide a summary of the sample types and locations for each project conducted under this Multi-Area FSP to date, as well as new projects being added in this revision. These projects include the following (note: as described in Subsection 1.5 of this Multi-Area FSP, the summaries of projects included in previous revisions of this document have not been revised or deleted):

1. Emergency response activities in the former powerhouse discharge channel at the 12th Street Landfill (as initially described in Revision 00, June 2007)
2. Emergency response activities on portions of the riverbank along the Plainwell Mill (as initially described in Revision 01, September 2007)
3. Predesign investigations for the remedial design for the 12th Street Landfill (added in this version of the Multi-Area FSP [i.e., Revision 02, February 2008]).

The subsections below also reference Standard Operating Procedures (SOPs; Appendix A), example forms and logs (Appendix B), and QAPP worksheets (Appendix C). To date, a total of seven SOPs have been prepared to describe applicable sampling procedures and protocols (SOPs F-1 through F-7; see Appendix A). New SOPs, forms and logs, and QAPP worksheets, which are developed as part of future workplan submittals, will be included in later revisions of this Multi-Area FSP, as described in Subsection 1.5.

2.2 OU-4: Emergency Response – Former Powerhouse Discharge Channel Sampling and Monitoring Activities

In late February, 2007, the U.S. EPA authorized a Time-Critical Removal Action (TCRA) to remove polychlorinated biphenyl (PCB)-contaminated sediment in the former Plainwell Impoundment (a section of Operable Unit No. 5 of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site). This work was subsequently implemented through an administrative settlement agreement and Order on Consent for Removal Action (V-W-07-C-8-63). As part of the TCRA, the earthen section of the Plainwell Dam will be removed and the Kalamazoo River will be rerouted through the former powerhouse channel. The 12th Street Landfill abuts the river and is located directly downstream of the earthen section of the Plainwell Dam. The Plainwell Mill also abuts the Kalamazoo River and PCB-containing materials have been documented along the river bank at the Mill. The change in the Kalamazoo River channel will result in an increased river gradient and higher velocities upstream and along the rerouted channel (USGS 2004 and USDA, 2004). The modified river flow is expected to mobilize residuals currently present in the powerhouse channel downstream and to erode bank material in the area of the Mill. Thus, the TCRA scope of activities are actions or occurrences which threaten releases of Waste Material (as defined in the CD) from both the 12th Street Landfill and the Plainwell Mill property. Since any such release may present an immediate threat to public health or welfare of the environment, Weyerhaeuser has been authorized to conduct several emergency response actions in conjunction with completing the required work under the CD.

The following subsections describe sample collection procedures, sample handling methods, and other procedures pertaining to the following general sampling categories:

- Surface water sampling and field measurements
- Surface water and flow measurement
- Water treatment system sampling
- Sediment sampling
- Soil sampling using direct push equipment

SOPs for each type of sampling activity are provided in Appendix A. These SOPs describe or reference ancillary procedures for equipment cleaning, field measurements, and calibration and maintenance of field instruments, as appropriate.

2.2.1 Sample Collection Procedures

Water Monitoring and Field Measurements

Surface water monitoring and field measurements will be performed during the emergency action activities to meet various objectives including:

- Measurement of surface water PCB and total suspended solids (TSS) concentrations in river water.
- Measurement of potentially transported PCBs and suspended sediments in river water.

- Monitoring of trends in surface water PCB concentrations over time.
- Monitoring of the relative effects of removal activities on turbidity and PCBs in the main river water column outside the channel during the removal actions.
- Monitoring of turbidity of infiltrating groundwater to establish discharge location.
- Evaluation of water quality associated with the water treatment system.

Several data collection methods will be used to achieve these objectives, depending on the purpose and intent of the data, and the DQOs specified in the applicable area-specific work plan and FSP addendum. SOPs for surface water data collection are provided in appendices to this document that can be used together or separately as needed to satisfy the goals of data collection. Specific SOPs are provided for:

Surface Water and Field Measurement Procedures (SOP F-1). This SOP will be used for the collection of a water column sample for laboratory analysis and can be applied to grab samples, vertically integrated samples, bottle sampling, or sampling using a specific device, such as an ISCO automated sampler or peristaltic pump. This SOP will be used for most samples collected from the river for PCB and TSS analysis. It can also be used for the collection of grab samples from an open channel, the end of a pipe, or from anywhere within a water treatment stream. This SOP includes the use of standard hand-held metering devices and should be used to collect field measurements of surface water quality parameters including turbidity, temperature, dissolved oxygen (DO), and conductivity.

Surface Water Flow Measurement Procedures (SOP F-2). This SOP will be used to measure flow in the river by measuring cross-sectional area and velocities across the channel at the point of measurement.

Water Treatment System Monitoring Procedures (SOP F-3). This SOP describes the field procedures for collection of in-field water treatment system measurements including grab samples for PCB analysis at the effluent of the water treatment system, grab samples for TSS at the effluent of the water treatment system, and grab samples for phosphorus at the effluent of the water treatment system.

Sediment Sampling

Sediment sampling will be performed during the OU-4 Emergency Response activities to meet various objectives, including:

- Identify the distribution and physical characteristics of sediments.
- Characterize the nature and extent of PCBs in sediments present in the Former Powerhouse Channel.
- Monitor the effects of removal activities and determine post-removal PCB concentrations in sediment.

To support these objectives, sediment samples will be collected as intact cores to provide samples at depth, or as surficial grab samples to characterize the sediment at the top of the sediment bed. Core samples will be collected using polycarbonate tubing unless other methods are identified by the area-specific work plan or FSP addendum. Surface grab samples will be collected using sediment core methods or using a petit Ponar dredge. SOPs for sediment collection methods are provided in:

Sediment Sampling Procedures (SOP F-4). This SOP provides field procedures for the collection of sediment samples, sediment cores, and probing for bathymetric surveys.

Geotechnical Soil Sampling

The purpose of the geotechnical investigation is to determine the extent, height and width, and materials used in the berm along the Kalamazoo River so that a slope stability evaluation can be completed. The location of the berm will be used to assess potential adverse affects to the stability of the fill material that may occur as a result of cutting back existing material along the riverfront. Visual observation of the materials used in the construction of the berm will be used to approximate the physical characteristics of the material, which will be used in the stability model. Together, the location and the physical characteristics of the berm will be used to model the stability of the landfill, provide data to help assess whether or not the vegetation present along the river can be preserved, and ultimately to provide inputs to the design of a stable final slope.

Soil Sampling Procedures with Direct Push Equipment (SOP F-5). This SOP provides field procedures for the collection of soil samples utilizing a direct push sampler.

2.2.2 Sample Locations

Specific sample locations depend upon both the types of samples being collected and field conditions. Many sample locations will be established based in the field based upon site-specific conditions that impact the ability to collect representative samples and the guidelines in the work plan, QAPP and this FSP. Available information by sample type is summarized in Table 2-1.

2.3 OU-5: Emergency Response – Plainwell Mill Banks

In a letter dated June 29, 2007, the United States Environmental Protection Agency (U.S. EPA) has authorized Weyerhaeuser Company, under Paragraph 67 of their 2005 Consent Decree, to take actions to prevent, abate, or minimize a release or potential release of hazardous substances from the former Plainwell Mill banks (part of the Kalamazoo River Operable Unit [OU-5]).

The following subsections describe sample collection procedures, sample handling methods, and other procedures pertaining to the following general sampling categories.

- Surface water sampling and field measurements
- Surface water and flow measurement
- Water treatment system sampling
- Sediment sampling
- Surficial soil sampling

SOPs for each type of sampling activity are provided in Appendix A. These SOPs describe or reference ancillary procedures for equipment cleaning, field measurements, and calibration and maintenance of field instruments, as appropriate.

2.3.1 Sample Collection Procedures

Water Monitoring and Field Measurements

Surface water monitoring and field measurements will be performed during the Plainwell Mill Banks Emergency Action activities to meet various objectives including:

- Measurement of surface water PCB and total suspended solids (TSS) concentrations in river water.
- Measurement of potentially transported PCBs and suspended sediments in river water.
- Monitoring of trends in surface water PCB concentrations over the duration of the construction activities.
- Monitoring of the relative effects of removal activities on turbidity and PCBs in river water column adjacent to the banks during the residual removal actions.
- Evaluation of water quality associated with the water treatment system.

Several data collection methods will be used to achieve these objectives, depending on the purpose and intent of the data, and the DQOs specified in the applicable area-specific work plan and FSP addendum. SOPs for surface water data collection are provided in appendices to this document that can be used together or separately as needed to satisfy the goals of data collection. Specific SOPs are provided for:

> *Surface Water and Field Measurement Procedures* (SOP F-1). This SOP will be used for the collection of a water column sample for laboratory analysis and can be applied to grab samples, vertically integrated samples, bottle sampling, or sampling using a specific device, such as an ISCO automated sampler or peristaltic pump. This SOP will be used for most samples collected from the river for PCB and TSS analysis. It can also be used for the collection of grab samples from an open channel, the end of a pipe, or from anywhere within a water treatment stream. This SOP includes the use of standard hand-held metering devices and should be used to collect field measurements of surface water quality parameters including turbidity, temperature, dissolved oxygen (DO), and conductivity.

> *Surface Water Flow Measurement Procedures* (SOP F-2). This SOP will be used to measure flow in the river by measuring cross-sectional area and velocities across the channel at the point of measurement.

> *Water Treatment System Monitoring Procedures* (SOP F-3). This SOP describes the field procedures for collection of in-field water treatment system measurements including grab samples for PCB analysis at the effluent of the water treatment system, grab samples for TSS at the effluent of the water treatment system, and grab samples for phosphorus at the effluent of the water treatment system.

Sediment Sampling

Sediment sampling will be performed during the Plainwell Mill Banks Emergency Action activities to meet various objectives, including:

- Identify the distribution and physical characteristics of bank sediments.
- Characterize the nature and extent of PCBs in sediments present along the Plainwell Mill Banks.
- Monitor the effects of removal activities and determine post-removal PCB concentrations in near-bank sediment.

To support these objectives, sediment samples will be collected as intact cores to provide samples at depth, or as surficial grab samples to characterize the sediment at the top of the sediment bed. Core samples will be collected using polycarbonate tubing unless other methods are identified by the area-specific work plan or FSP addendum. Surface grab samples will be collected using sediment core methods or using a petite Ponar dredge. SOPs for sediment collection methods are provided in:

> *Sediment Sampling Procedures* (SOP F-4). This SOP provides field procedures for the collection of sediment samples and cores.

Post Construction Soil Confirmation Sampling

The purpose of the post construction soil confirmation sampling is to evaluate the success of the residual removal activities in the Plainwell Mill bank along the Kalamazoo River. A geotechnical evaluation may be required in order to evaluate slope stability. The need for this evaluation will be confirmed in the field during removal activities.

> *Surficial Soil Sampling Procedures* (SOP F-6). This SOP provides field procedures for the collection of soil confirmation samples utilizing stainless steel scoops.

2.3.2 Sample Locations

Specific sample locations depend upon both the types of samples being collected and field conditions. Many sample locations will be established based in the field based upon site-specific conditions that impact the ability to collect representative samples and the guidelines in the work plan, QAPP and this FSP. Available information by sample type is summarized Table 2-2. Additional details regarding the sampling program are included in Table 3-1 of the Design Report.

2.4 OU-4: Predesign Investigations – Remedial Design for the 12th Street Landfill

Operable Unit #4 (OU-4) of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Kalamazoo River Superfund Site) consists of the closed 12th Street Landfill and four areas outside the landfill where PCB-contaminated residual material has been observed. The 24-acre parcel includes the 6.5-acre landfill and approximately 17 acres of wetlands to the north/northwest of the landfill. Additional portions of OU-4 include the woodland area owned by the State of Michigan (State) under management of the Michigan Department of Natural Resources (MDNR), the gravel operation adjacent to the landfill, and the former powerhouse discharge channel, which are located outside the landfill property line.

Contamination in the former powerhouse discharge channel was addressed as part of Emergency Actions implemented in 2007.

The 12th Street Landfill accepted paper residuals from the former Plainwell Mill (mill), located in Plainwell, Michigan, during the period from approximately 1955 to 1981. The landfill reportedly also accepted solid waste from the mill during part of its period of active operation. A number of investigations have been performed at the site. The investigations have confirmed the nature of the material in the landfill and have shown that paper residuals are present in certain areas outside of the landfill (i.e., in the wetlands to the north/northwest, the quarry property, and the State property). Some of the residuals/native soil beyond the toe of the landfill (i.e., outside the footprint of the landfill) may contain PCBs at concentrations exceeding State of Michigan or Kalamazoo River Superfund Site-specific ecological risk-based criteria.

A Record of Decision (ROD) for OU-4 was issued on September 28, 2001. In general, the components of the selected remedy include (1) the excavation and relocation of residuals potentially containing PCBs in the wetland, woodland, quarry property, and former powerhouse discharge channel into the landfill; (2) the excavation and relocation of the eastern slope of the landfill along the river sufficient to create a buffer zone that will prevent hydraulic connection between the fill material and the river; (3) the installation of an engineered cover pursuant to state requirements for a solid waste landfill (Part 115); (4) the installation of a sidewall containment system; (5) the evaluation of the need for a gas venting system within the final cover system; (6) the evaluation of the need for a leachate collection system; (7) short-term and long-term monitoring; (8) fencing, warning signs, deed restrictions, and noise and dust control; and (9) long-term maintenance and post-closure care.

In January 2005, Weyerhaeuser Company (Weyerhaeuser) negotiated a Consent Decree (CD) with the U.S. EPA (Civil Action No. 1:05-CV0003) for the design and implementation of certain response actions at Operable Unit #4 and the Plainwell Inc., Mill. Specifically, the CD requires Remedial Design (RD) and Remedial Action (RA) activities for the 12th Street Landfill and RI/FS and RD/RA activities for the former Plainwell Mill (Operable Unit #7). This revision of the Multi-Area Field Sampling Plan (FSP) has been prepared in fulfillment of the requirements for an RD Workplan for the 12th Street Landfill that are contained in the CD and the Statement of Work (SOW).

The RD Workplan for the 12th Street Landfill includes a number of predesign investigations, some of which involve field data collection and visual observations. Field data collection activities will include visual information obtained by the advancement of test pits, visual information obtained by the advancement of Geoprobe® borings, and gas concentration measurements (methane, carbon dioxide, and oxygen) in certain existing monitoring wells and in the Geoprobe® borings advanced as part of the predesign investigation. Pressure will also be recorded in certain existing monitoring wells.

The field investigations will involve (1) a refined estimate of the extent of visible paper residuals beyond the landfill footprint; (2) the collection of data to support the grading design for the landfill; and (3) the collection of data for use in the design of a landfill gas management system. SOPs for each type of sampling activity are provided in Appendix A. These SOPs describe or reference ancillary procedures for equipment cleaning, field measurements, and calibration and maintenance of field instruments, as appropriate.

2.4.1 Sample Collection Procedures

Data for Grading Design

Additional data is required to better estimate the thickness of paper residuals along the property boundaries with 12th Street, the quarry to the southwest, and with the State property to the southeast, in order to reduce uncertainties in designing the final cover grades, and to support discussions with the owners of these adjacent properties concerning access. The scope of the investigative work necessary to obtain these data is as follows:

- Advance approximately nine Geoprobe® borings into the 12th Street Landfill at select locations where fill material is believed to extend beyond the property boundary to the southwest and to the southeast. The borings will be advanced to approximately 5 feet into the native soil underlying the fill, or to refusal. Each borehole will be given a unique identification number.
- Advance a minimum of two soil borings near the southern end of the landfill to confirm the thickness of the fill in this area. Advance the borings approximately 5 feet into the native soil underlying the fill or to refusal. The locations of these borings may be adjusted in the field as necessary to avoid underground or aboveground utility lines. Additional borings may be installed to the north of the initial borings as may be deemed useful by Weyerhaeuser, in consultation with oversight agencies as needed, for purposes of designing the landfill cover (*e.g.,* if fill material is not encountered at a location where existing data indicates fill is present).
- Prepare a Soil Boring Log (refer to Appendix B for a sample log) for each borehole based on visual observation. Classify the materials encountered based on the procedures outlined in ASTM D2488. The logs will document the borehole identification number, the drilling dates and times, names of field personnel, soil descriptions, sample depths, and recovery. Retain a representative sample of each type of material encountered (no laboratory analyses are planned). As may be appropriate, photographs of the materials encountered or other pertinent observations will be documented. Photographs will be labeled to indicate the subject, location, date, name of photographer, and project identification number.
- The on-site geologist/engineer will prepare the Soil Boring Logs in the field. The logs will be reviewed by the senior engineer in the office. A field notebook will also be maintained by the on-site geologist/engineer to document other pertinent

field information. The senior engineer will review the field notebook for clarity and completeness in meeting the investigation objectives.

- Following completion of the borehole logs, abandon the boreholes by filling them with a bentonite grout.
- Decontaminate the drilling equipment following completion of the work. Decontamination of equipment between borings is not necessary. Decontamination will be performed at the site.
- Dispose Geoprobe® samples on-site. Containerize the decontamination water in 55-gallon barrels that will be properly labeled and stored on site.
- Survey the locations and ground surface elevations of the boreholes following completion. The accuracy of the survey will be ± 0.01 foot for the horizontal coordinates and ± 0.1 foot for the vertical elevations. The survey locations will be added to the boring logs.

A more detailed description of field procedures for soil sampling using direct push methods (i.e., Geoprobe®) is provided in SOP F-5 (Appendix A).

Landfill Gas Evaluation

Based on experience at other landfills containing similar materials, a passive gas venting system may to be necessary to prevent potential off-site migration from the landfill and to protect the integrity of the landfill cover. Thus, a detailed design for a passive gas venting system will be prepared during the design phase for the 12th Street Landfill. The design for the gas venting system may include features that support a potential future educational nature park. The passive gas venting system will also be designed such that it could be retrofitted to an active gas system if deemed necessary during the operation, monitoring, and maintenance (OM&M) period for the landfill.

To assist in the design for the passive gas venting system, the following scope of field investigations will be performed:

- As accessible, measure the concentrations of methane, carbon dioxide, and oxygen in the existing groundwater monitoring wells at the 12th Street Landfill that are screened in the vadose zone (MW-6A, MW-7A, and MW-8A), and in the Geoprobe® boreholes used to estimate the depth of the paper residuals along the property boundaries.
- As accessible, measure the gauge pressure in the existing groundwater monitoring wells at the 12th Street Landfill that are screened in the vadose zone (MW-6A, MW-7A, and MW-8A).

A passive gas venting system can be designed without the above information. If these data cannot be readily obtained, additional efforts will not be employed to collect this information

Field procedures for soil gas collection and sampling, and pressure measurements, are provided in SOP F-7 (Appendix A).

Extent and Depth of Residuals Outside the Landfill Footprint

Wetland Area to the North of the Landfill - The approximate areal extent of visible paper residuals beyond the toe of the landfill within the wetland has been defined through previous investigations. This delineation needs to be confirmed at limited locations as part of the predesign studies. In addition, constructibility issues associated with a high water table in the wetland and the degree of difficulty in distinguishing the visible paper residuals from the native soil also need to be evaluated. The scope of the investigative work recommended to provide this information is as follows:

- A backhoe will be used to excavate approximately 3 test pits in the wetland to the north of the landfill to confirm the approximate areal extent of visible paper residuals beyond the toe of the landfill, to evaluate potential constructibility issues associated with working in the wetland, and to assess the degree of difficulty in distinguishing the visible paper residuals from the native soil.
- The test pits are anticipated to be approximately 10 to 15 feet long (perpendicular to the edge of the landfill) and approximately 2 to 4 feet wide. The test pits will be excavated to a maximum depth of 3 feet if no paper residuals are apparent, or to the bottom of visually-identifiable residuals. The depth and lateral extent of residuals in each test pit will be documented in the field by preparing a Test Pit Log (refer to Appendix B for a sample log).
- In order to meet the investigative objectives, additional test pits may be constructed either closer to or farther from the toe of the landfill in order to adequately confirm the limits of the paper residuals.
- In the event that in-field conditions limit the use of excavating equipment, other tools, such as hand augers or shovels, may be used instead. In such instances, Weyerhaeuser's representative will discuss the site conditions with a U.S. EPA representative, if one is available in the field, and will solicit additional ideas for collecting the targeted information. If a U.S. EPA representative is not available in the field, decisions will be made in the field by Weyerhaeuser to collect the targeted information. Weyerhaeuser will document such field modifications.

Quarry/State Properties - The areal extent of visible paper residuals on the quarry property to the southwest and on the State property to the southeast need to be delineated and the depth of visible paper residuals needs to be estimated more accurately in order to support discussions with the owners of these adjacent properties concerning access for future removal activities. The scope of the investigative work recommended to provide this information for the quarry/State properties is as follows:

- A backhoe will be used to excavate approximately 3 test pits on the quarry property and approximately 4 test pits on the State property.
- The test pits are anticipated to be approximately 10 to 15 feet long (perpendicular to the edge of the landfill) and approximately 2 to 4 feet wide. The test pits will be excavated to a maximum depth of 3 feet if no paper residuals are apparent, or to the bottom of visually-identifiable residuals. The depth and lateral extent of residuals in each test pit will be documented in the field by preparing a Test Pit Log (refer to Appendix B for a sample log).
- In order to meet the investigative objectives, additional test pits may be excavated to adequately confirm the limits of the paper residuals.
- In the event that in-field conditions limit the use of excavating equipment, other tools, such as hand augers or shovels, may be used instead. In such instances, Weyerhaeuser's representative will discuss the site conditions with a U.S. EPA representative, if one is available in the field, and will solicit additional ideas for collecting the targeted information. If a U.S. EPA representative is not available in the field, decisions will be made in the field by Weyerhaeuser to collect the targeted information. Weyerhaeuser will document such field modifications.

2.4.2 Sample Locations

Specific sample locations depend upon the types of samples being collected and on the field conditions. Many sample locations will be established based in the field based upon site-specific conditions that impact the ability to collect representative samples and the guidelines in the work plan, QAPP and this FSP. Available information by sample type is summarized in Table 2-3. Additional details regarding the field program are included in the RD Workplan (RMT, 2008b).

Section 3
Sample Designation, Control, and Field Records

3.1 Sample Designation

Samples will be assigned a unique alpha-numeric sample descriptor identifying the media types, the sample location, and in certain instances, the sample depth (or sample number). Each sample will be labeled as follows:

[sample location] - [sample matrix] - [sample number] - [sample date] (YYMMDD)

The following sections discuss the sample numbering system in greater detail.

3.1.1 Sample Location

The first entry for each alpha-numeric sample descriptor will be a sample location designator, which will be assigned as described below.

- PDC – Former Powerhouse Discharge Channel
- LF – 12th Street Landfill
- PM – Plainwell Mill
- WTS – Water Treatment System

3.1.2 Sample Matrix

The second portion of each alpha-numeric sample descriptor will be a two-letter alphabetical code that describes the sample matrix. Matrix codes for the investigation are as follows:

- "SD" for sediment
- "SW" for surface water
- "SL" for soil
- "EW" for effluent water from treatment system
- "FB" for field blanks
- "TB" for trip blanks
- "FD" for blind field duplicate samples

3.1.3 Sample Number

For environmental samples, a unique sample number will be designated for each new physical sample collected. For example soil boring number one at the Plainwell Mill will be named WYPMSL01. For soil or sediment borings where more than one subsurface sample is obtained at a given location, each sample name will include a "D" followed by the sample depth range in feet (*e.g.*, 0 to 0.5 feet; WYPMSL01D0.0.0.5ft). Water samples taken at a specific depth will only include the specific depth (not a range). In addition, the sample name will also include an identifier for the specific monitoring location upstream or downstream of the work activities and its relative monitoring position moving from upstream to downstream (*e.g.*, 1st Upstream location, U1; Downstream of activities and downstream of two other sampling stations, D3). The position of each surface water station will be recorded with a GPS and written into the appropriate field log book. The specific depth interval at which each sample is collected will be recorded to the nearest tenth of a foot in the comments section of the Chain-of-Custody Record and in the appropriate field notebooks.

For QA/QC samples such as field blanks, trip blanks, and blind duplicates, samples will be numbered sequentially beginning with "001" and will be recorded in the appropriate field notebook. A sample for which additional volume is collected for matrix spike/matrix spike duplicate analyses will have the suffix of "-MS/MSD" added to the sample identification number.

3.1.4 Sample Date

For each sample the date and time that the sample was collected using 2-digit numeric codes for the year, month, and date of the sample (*e.g.*, 070501 would be the sample date for a sample collected on May 1, 2007) and military time (24:00). The sample time will be noted in the appropriate field log books and on the COC.

Example Sample Description	Associated Sample Naming Convention
The first sediment boring collected in the former powerhouse discharge channel. Depth collected was 1 to 2 feet. Sample date and time was July 1, 2007, at 1:00 p.m.	WYPDCSD01D1.0.2.0ft
Fifth water surface sample collected at the second downstream monitoring location at the powerhouse discharge channel. Surface water sample collected at a mid-depth of 3 feet on July 2, 2007, at 7:00 a.m.	WYPDCSW05D3.0ftD3

3.2 Sample Containers and Preservation

The sample containers, preservation and handling procedures will follow the standard analytical requirements as described in the QAPP and collection procedures described in the SOPs. The analytical laboratory will supply the appropriate containers for sample collection and preservation. The field personnel is responsible for proper collection, labeling, recording and preservation (*i.e.*, on ice) of samples. Sample containers will be labeled in accordance will the sample designation described in Section 3.1.

3.3 Chain-of-Custody Procedures

The sampler is responsible for sample custody from the time of sample collection to receipt at the laboratory or until samples are shipped by commercial carrier. A sample is considered under custody if one of the following conditions apply:

- The sample is in a person's possession.
- The sample is in that person's view after being in his or her possession.
- The sample was in that person's possession and then placed in a secured location.
- The sample is in a designated secure area.

Sets of sample containers that are shipped together will be assigned a Chain-of-Custody Record, which will travel with the sample containers. A copy of the Chain-of-Custody Record with its assigned sample numbers will be kept in the laboratory to help identify samples that might become separated from the discrete sample delivery group. When shipped by a commercial carrier, custody seals will be attached to each cooler to ensure that tampering with the samples does not occur in transit, and the shipment airbill will be kept as Chain-of-Custody documentation.

3.4 Field Records

This section of the FSP describes requirements and procedures for documentation of field activities. It is essential that all field documentation provide a clear, unbiased description of field activities. Examples of all of the forms mentioned in this FSP are included in Appendix B.

3.4.1 Daily Log

Serially numbered, bound field notebooks will be used on work assignments requiring field activities. Daily field activities will be recorded in the bound field notebooks. In addition, several sample collection notebooks will contain bound sample collection forms, including soil boring logs, monitoring well construction diagrams, monitoring well development forms, groundwater sampling summary forms, and groundwater and surface water level measurement forms. Representative forms are provided in Appendix B. The on-site coordinator (OSC) will be responsible for issuing field notebooks. A record will be maintained by the OSC documenting the assignment of field notebooks. The OSC will distribute and track bound and numbered field notebooks. Transfers of field notebooks to other individuals (including subcontractors) who have been designated to document specific tasks on the project will be recorded. No field notes may be destroyed or discarded, even if they are illegible, or known to contain inaccuracies.

Entries into field notebooks will be legibly written and will provide a clear record of field activities. Entries will be made in waterproof ink and in language that is objective, factual, and free of personal opinions or terminology that might later prove unclear or ambiguous. Errors in the field notes will be indicated by drawing a single line through the text, such that the text in error remains legible. Errors addressed in this manner will be initialed and dated by the person making the correction. The person taking notes in the field notebook will sign, number, and date each page and will document the date, time, location on site, name of field personnel present, and weather conditions observed. Specific sample collection methods will be included in the field notes.

Field personnel responsible for taking notes will log photographs in the field notebook. Locations of the photographs will be referenced to a site sketch or map. Use of measurements and readings from on-site health and safety equipment will be recorded. Observed potential hazards to health and safety will be described. The level of protection and the decontamination procedure used will be documented.

3.4.2 Soil Boring Logs

Soil borings completed by the field team will be documented in a Soil Boring Log. The log will document the drilling locations, drilling dates and times, names of drilling personnel and logging personnel, soil descriptions, sample depths, and recovery.

3.4.3 Soil Sample Logs

Soil samples collected by the field team will be documented in a Soil Sample Log. The log documents the sample identifiers; soil types; sampling times, depth and location of each sample; sampling equipment used; color, odor, and appearance of the samples; sample parameters; container descriptions; sample preservatives; and names of sampling personnel.

3.4.4 Water Sample Log

All surface water and/or groundwater samples collected by the field team will be documented in a Water Sample Log. The log will document the sample identifiers, replicate identifiers, if any;

purging (groundwater) and sampling times and locations; sampling equipment; color, odor, and appearance; sample container descriptions; sample preservatives; and sampling personnel.

3.4.5 Sediment Sample Log

All sediment samples collected by the field team will be documented in the Sediment Sample Log. The log will document the sample identifiers, replicates, sample times, date and location. In addition, sediment appearance, type color, odor etc, will be described. Sample containers, preservatives and sampling personnel will be recorded in the Sediment Sample Log.

3.4.6 Chain-of-Custody Record

The Chain-of-Custody (COC) Record is a multi-copy record, which documents the custody of the samples from sample collection through laboratory analysis. The record includes spaces for signatures of those receiving and relinquishing the samples. The sampler, the individual preparing the samples for shipment, and the individual receiving the samples at the laboratory normally sign the record.

The field personnel collecting the sample will fill out the COC Records. The COC process will be initiated upon sample collection. The field person who signs the record will be responsible for the samples until they are transferred to the custody of the laboratory or another custodian. Once the record has been completed, all remaining field sample identification spaces will be crossed through to prevent unauthorized addition of sample information.

The information required on the COC Record includes the complete sample identifier, date and time of sample collection; number of sample containers; analyses and methods required; container type; project number; name of sample collection personnel; complete name, address, and telephone number of the person who will receive analytical reports; turnaround time; and signatures of all sample custodians, excluding shippers. In addition, the method of shipment, and the courier's name and air bill number must be included. The back copy of the record will be retained. The original record will accompany the sample shipment to the laboratory.

3.5 Photographs

As discussed in subsection 3.4.1, photographs taken in the field will be documented in the field notebook at the time the photograph is taken. Locations of photographs will be referenced to a site sketch or map. After the film is developed or the images are uploaded onto a computer, the photographs will be labeled with the following information:

- Project identification number
- Date

- Location
- Direction viewed in photograph
- Roll number (if applicable)
- Frame number
- Sample number (if appropriate)
- Initials of the photographer

Section 4
Sample Handling and Analysis

This section presents general sample handling and analysis protocols. Additional detailed information is contained in the QAPP.

4.1 Sample Containers and Shipping

A table summarizing the sample containers, preservation methods, and holding times for solid and liquid samples, which are collected under this Multi-Area FSP and intended for chemical analyses, is provided in Worksheet # 19 in the Multi-Area QAPP. These sample containers, preservation methods, and holding times meet U.S. EPA and Michigan Department of Environmental Quality (MDEQ) standards. For samples intended for VOC analysis, the sample containers will be filled completely to minimize airspace. Sample containers for other analytical group analyses will be filled to nearly full to avoid overtopping and loss of preservative (if applicable), and to meet the minimum sample volume/mass required by the laboratory (see Worksheet #19 in the Multi-Area QAPP). Soil samples intended only for physical testing (*e.g.*, grain size) will be placed in clean glass jars (minimum 8-oz. volume).

From the time the samples are collected and labeled until delivery to the laboratory, samples will be kept in a dark or otherwise lower temperature location, on ice and within a hard plastic ice chest or cooler that has a white interior. For delivery of samples to the laboratory, the following procedure will be implemented:

1. Collect and preserve the samples as outlined in the FSP and QAPP.
2. Place sample containers in a laboratory shipping container(s). Samples will be packed securely with packing material to protect sample containers from accidental breakage during shipment and to prevent leaks or spills.
3. Fill shipping container with enough ice to last the trip. Double-bag the ice to ensure sample integrity. Dry ice and/or blue ice (ice packs) will not be used.
4. Complete the Chain-of-Custody Record as described in Subsections 3.3 and 3.4.6 and in the QAPP.
5. Tape the Chain-of-Custody Record to the inside of the shipping container lid.
6. Seal shipping container with strapping tape, and place a custody seal (provided by the laboratory) on the shipping container prior to shipping.
7. Deliver or ship the container to the laboratory using an overnight shipping service.

Responsibility for proper use of containers and preservatives will be under the oversight of the OSC.

4.2 Selection of Parameters

The number and location of the samples to be collected and the selection of parameters to be analyzed are summarized in Tables 2-1 through 2-3 and in Worksheets #17-1, #17-2, #17-3, #18-1 and #18-2 in the Multi-Area QAPP.

4.3 Analytical Procedures

The selection of analytical procedures reflect U.S. EPA-approved methodology from the SW-846 Methods and MDEQ-approved methodology under the Michigan Part 201 Program, where applicable, as stated in the QAPP. Other methods designed to meet project-specific objectives are also defined in the QAPP. A list of the analytical procedures is provided in Worksheet #23 in the Multi-Area QAPP.

4.4 Sampling Quality Assurance Procedures

The sample collection procedures presented in this FSP are designed to provide samples of the required quality to meet site investigation objectives. All field personnel will be required to understand the requirements of this FSP and will be trained in the use of the specified equipment and techniques.

The RMT OSC is responsible for reviewing the day-to-day activities to ensure that the procedures in the FSP are followed. Specific activities that will be implemented by the OSC include the following:

- Convene a meeting of field personnel at the start of a specific sampling event to review the sampling requirements of the FSP, the necessary equipment and decontamination requirements and use, and the required documentation.
- Review all documentation on a daily basis for completeness, errors, problems, and corrective actions taken.
- Convene daily project team meetings at the start of the day to discuss health and safety, to address any problems developed during the previous day's work, and to review the work to be completed that day.
- Manage the implementation of in-field corrective actions. The RMT project manager will be notified of significant problems and, if necessary, will work with the OSC to develop corrective actions. The project manager will be responsible for implementing corrective actions that need to be applied to areas other than field activities.

4.4.1 Field Measurements

The equipment used for in-field measurement will be maintained, calibrated, and operated in the field according to the procedures described in the select SOPs in Appendix A. Field calibration of equipment is described within the QAPP Worksheet #22. The process will be documented, and the OSC will periodically review the documentation and inspect the equipment to ensure that the procedures are followed by the personnel collecting the samples. Significant deviations from the FSP, errors, equipment failures, or other problems will be documented in a bound notebook by the

OSC and reported to the RMT project manager. Corrective actions and additional notifications will be coordinated by the project manager.

4.4.2 Sample Collection

Personnel involved in the collection of samples are required to read, understand, and follow the procedures specified in this FSP. Problems that may affect the quality of the sampling effort will be documented by the field personnel most directly involved with the problem, and the OSC will be notified. The OSC is responsible for coordinating the development and implementation of corrective actions with the RMT project manager.

4.4.3 Field Data Reduction

Raw data from field measurements and sample collection activities will be recorded in the field logs as specified in Section 3.4. With the exception of the temperature correction for specific conductance, no calculation will be required in field data reduction. Only direct-reading instrumentation will be employed in the field. The OSC will proofread all forms and notebooks to for consistency with the planned activities and to also determine if transcription errors have been made by the field crew.

4.4.4 Analytical Quality Assurance Considerations

Field Duplicates

Blind field duplicate samples, prepared by splitting a single sample into two separate containers, will be used to evaluate sampling precision. Points at which duplicate samples are to be collected will be selected by field personnel and will be submitted as blind duplicates to the laboratory. Field personnel are expected to provide a general range of expected concentrations to the laboratory for these samples to minimize impacts on laboratory equipment.

Blind field duplicates will be collected at a frequency of one sample per 10 primary samples for soil and groundwater matrices, as summarized in Worksheet #20 in the Multi-Area QAPP. Sample identification protocols are provided in Subsection 3.1 of this FSP.

Field Equipment Blanks

Field equipment blanks consisting of analyte-free water will be collected and submitted to the analytical laboratory to assess the quality of the data resulting from the field sampling program. Field equipment blanks are analyzed to check for procedural contamination at the site that may cause sample contamination. Field blanks will be collected following decontamination of the nondedicated sampling equipment, including pumps and soil samplers. Field blanks will not be collected for disposable or dedicated sampling equipment, such as tubing dedicated to a specific well.

Field equipment blank frequencies are also provided in Worksheet #20 in the Multi-Area QAPP. In general, field equipment duplicates will be collected at the rate of one duplicate per ten primary samples for groundwater and soil matrices. The exception is the low-level mercury sampling locations, at which one equipment blank will be generated for each location sampled. Identification protocols are provided in Subsection 3.1 of this FSP.

Trip Blanks

Trip blanks will be analyzed to assess the possible cross-contamination of VOCs resulting from diffusion through septa during sample shipment. Trip blanks, consisting of 40-mL VOA vials with deionized ASTM Type 2 organic-free water, are generated in the laboratory and accompany VOC sample coolers from the laboratory to the field and back to the laboratory. Trip blank containers are not opened in the field. Trip blanks prepared by the laboratory will meet holding time requirements. One trip blank, consisting of two VOA vials, will be shipped with each cooler containing VOC sample containers. Trip blank identification protocols are provided in Subsection 3.1.

Field Blanks

Field blanks will be analyzed to assess the suitability of the container, preservative, and sample handling. The field blank is generated by pouring the solution provided in one of the sample containers into another sample container the contents of which had been emptied at the facility. One field blank will be collected per every 10 primary samples, as described in Worksheet # 20 in the Multi-Area QAPP.

Field blanks will be denoted by "F" followed by a 3-digit number, similar to the system used for duplicate samples (F-001-[Date], F-002-[Date]).

Matrix Spikes/Matrix Spike Duplicates (MSs/MSDs)

MS/MSD samples provide information about the effect of the sample matrix on the sample preparation and measurement methodology. MS/MSD samples will be analyzed in accordance with the laboratory operating procedures provided in the QAPP. In conjunction with other QC data, the spikes and duplicates give information on the precision and accuracy of the analytical method on the various sample matrices. One

MS/MSD sample will be collected and prepared for every 20 or fewer primary samples collected during a sampling round, as described in Worksheet #20 of the Multi-Area QAPP. The MS/MSD samples will consist of triple the normal sample volume for each analytical group, provided adequate sample volume is available. Field personnel will select the sampling locations at which MS/MSD samples are collected. MS/MSD identification protocols are provided in Subsection 3.1.

4.5 Field Audits

The Project Manager/Coordinator will monitor daily field performances through daily communications with the OSC and Construction Manager. Field performance audits and field system audits will be performed as follows:

- Field performance audits will be conducted in order to confirm that the activities are being performed according to the established plans. The field performance audits will be performed by the Senior Consultant QA Manager (or designee) at an appropriate frequency for the field activities. The audits will include a discussion of the project progress with the Project Coordinator and /or the review of field reports, as appropriate. The Senior Consultant QA Manager will record and document any observations made during field system audits, and will discuss the audit and any recommended changes/deviations to the field procedures with the project coordinator.
- Field system audits will be performed by the data QA manager including a review of rinse and trip blank data to identify potential deficiencies in field sampling and decontamination procedures, and a comparison of the scheduled QA/QC activities described in the QAPP with the QA/QC procedures being performed on the project. Field system audits will be performed at a frequency appropriate for field activities. The Data QA Manager will record and document any observations made during field system audits, and will discuss the audit and any recommended changes/deviations to the field procedures with the Project Coordinator.

4.6 Corrective Action

Field measurement corrective action may be necessary when the sample network is modified or when sampling procedures and/or field analytical procedures require modification in response to unexpected conditions. Technical staff and project personnel will be responsible for reporting all suspected technical or QA nonconformances or deficiencies of any activity or issued document by reporting the situation to the RMT on-site Field Sampling Coordinator or designee. The Field Sampling Coordinator will assess the suspected problems in consultation with the Project Coordinator or Data QA manager or designee, and will assist in making a decision based on the potential for the situation to impact the data quality. If it is determined that the situation warrants a reportable nonconformance requiring corrective action, the OSC will issue the nonconformance report. If appropriate, the RMT Field Sampling Coordinator will ensure that no additional work is dependent on the nonconforming activity is performed until the corrective actions are completed.

Details regarding laboratory data reduction, validation and reporting requirements are provided in Worksheet #14 and Worksheets # 34 through #36 of the QAPP. In addition details on field and laboratory audits and corrective actions are included in Worksheets #6-1, #6-2, #14, #31-1, #31-2, #32-1, #32-2, and #33 in the Multi-Area QAPP.

Section 5
Field Physical Measurements

Field measurements of topographic features, water levels, reference points, and other physical features will be required during the field investigations. The scope of such measurements depends upon the purpose for the particular measurement data.

Physical measurements will be traceable to the person making the measurement and to the specific piece of field equipment used to make that measurement. Equipment maintenance and calibration records will be kept in a bound field notebook, making all such procedures traceable. Time records will be kept using local time in the 2400-hour military format, recorded to the nearest 5 minutes.

Sampling locations will be surveyed and depicted on existing topographic maps. Surveying will be conducted according to the standard procedures described below. Control points used during the survey will be marked in the field and noted on the topographic maps.

5.1 Surveying of Sampling Locations

Accurate, complete, and informative surveying field notes are a primary objective in site mapping. The field notes are the most reliable record of measurements made and information gathered in the field. As stated in Subsection 3.4, information gathered will be recorded in bound notebooks. Notes will be permanent, legible, and complete.

The field notes will accomplish the following:

- Provide adequate and complete information that can be understood by someone other than the notetaker.
- Provide documentation of work completed or data gathered.

Two important aspects of each survey to be addressed in the field notes are as follows:

- ***Starting and ending points of the survey*** - The surveyor will explain and document the starting and ending points of the survey. This applies to both horizontal and vertical control. This will require a paragraph of explanation and sketches and/or cross-references to data in notes of previous surveys.
- ***Clear indication of final results and checking procedures*** - The final results and checks will be plainly indicated. Erasures will not be used, as they raise uncertainties about the reliability of the data. Alterations, additions, revisions, reductions, or comments added to field notes will be written in colored ink to indicate that such information is not part of the original field record. The person making such notations will initial and date each page so affected.

The following is a checklist of information to be included in the notebook:

- Date
- Names of survey crew members
- Weather conditions: observed temperatures, relative wind speed, and barometric pressure if an electronic distance meter (*e.g.,* a total station) is to be used
- Equipment used, listing the serial number or other identification
- Location of survey by section description or other legal parcel identification
- Project number
- North arrow
- Description of all monuments found
- Measurements (slope distance and vertical angles, temperature, taping, horizontal angles, etc.)
- Corrected distances and angles
- Description of monuments set
- Outline or sketch of major traverse or property boundary

The elevation of the measuring point of monitoring wells and a reference point on staff gauges will be surveyed to allow correlation of water levels. Additionally, ground elevations may be required for topographic purposes. Standard engineering leveling techniques, as described in basic surveying textbooks, establish the methodology for providing vertical control. The datum referenced for elevation control is the National Geodetic Vertical Datum (NGVD) of 1929, informally known as sea level datum, established by the U.S. Coast and Geodetic Survey. Benchmarks of known elevation will be used. If no benchmark is located in the vicinity of a site investigation, an arbitrary temporary benchmark will be established on a permanent location (*i.e.,* foundation or corner post). The locations of benchmarks utilized will be shown on a site sketch map. Elevation surveys will be conducted to form a circuit (*i.e.,* the survey line will be closed back to a benchmark). Third-order accuracy will be obtained on level circuits; for example, on a 1-mile circuit, the closure will be within 0.05 foot. Length of sight will not ordinarily exceed 250 feet, with turning point back-shots and fore-shots deviating no more than 50 feet from one another.

5.2 Surface Water Stage

Surface water stage will be measured on staff gauges graduated to 0.01 foot. Staff gauges will be surveyed at the same time that monitoring wells are surveyed, and will be referenced to NGVD. Measurements of water stage will be noted in field logs with date, time, and site location. Water stage will be recorded to the nearest 0.01 foot.

Section 6 Management of Investigation-derived Waste

6.1 Purge Water and Decontamination Water

6.1.1 OU-4 and OU-5 Emergency Actions

Wastewater produced from well development and well purging and decontamination water will be temporarily stored in appropriately sized container. This water will be appropriately managed, as follows.

- All decontamination water generated during cleaning of equipment will be stored in a temporary storage tank(s) at the site.
- During operations, the water will be treated in the on-site treatment system.
- Decontamination water that is generated after the treatment system is unavailable will be characterized to identify appropriate methods of off-site treatment and/or disposal. The water samples will be analyzed for the analytes required by the treatment and/or disposal facility.

6.1.2 OU-4 Predesign Investigation

Decontamination activities performed during the predesign investigation at OU-4 will be conducted on top of the landfill. Decontamination water will be discharged to the landfill surface at a rate that allows infiltration into the landfill without running off the landfill.

6.2 Soil

6.2.1 OU-4 and OU-5 Emergency Actions

Excess soil and samples that are produced during the drilling operations will be temporarily stockpiled at each drilling site and placed on a plastic liner. In the event of rain, and at the end of each work day, the pile will be covered with a plastic sheet. As drilling is completed at each work area, the temporary stockpile will be collected and placed into the sediment management areas at the top of the 12th Street Landfill, or into roll-off bins, barrels, 5-gallon buckets, or equivalent located in the primary staging area. After all drilling operations are completed, samples of the accumulated soil will be collected and characterized in accordance with landfill profile requirements. After determining the proper regulatory classification, the soil will be transported for off-site disposal at the 12th Street Landfill site or another permitted disposal facility (if necessary).

6.2.2 OU-4 Predesign Investigation

After the test pits are logged, the excavated material will be placed back into the excavation and compacted sufficiently to prevent erosion from surface water runoff. Vegetation will be reestablished through natural propagation of native species.

Soil cuttings generated during the drilling of Geoprobe® borings will either be placed in appropriately labeled containers (e.g., 55-gallon barrels) or stockpiled and covered with a impermeable material in a designated area. These materials will be incorporated under the final landfill cover as part of the Remedial Action.

6.3 Used Personal Protective Equipment and Noncontaminated Refuse

Used personal protective equipment and other types of general noncontaminated debris or waste materials produced during the fieldwork will be collected daily in sealed plastic bags, and placed in a waste dumpster that will be brought to the site for the project. The wastes will be disposed by a local commercial waste disposal contractor at the end of the fieldwork.

Section 7 References

RMT, Inc. 2008a. Multi-Area quality assurance project plan, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site. Revision 02. February 2008.

RMT, Inc. 2008b. Remedial design workplan, 12th Street Landfill, Otsego Township, Michigan. Operable Unit No. 4 of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site. Revision 0. February 2008.

USDA. 2004. Wells, R., E.J. Langendoen, and A. Simon. Numerical simulation of sediment loads and channel changes along the Kalamazoo River between Plainwell and Otsego City, Michigan. USDA-ARS National Sedimentation Laboratory Research Report. No. 44. 46 pp.

USGS. 2004. Syed, A.U., J. P. Bennett, and C.M. Rachol. A pre-dam-removal assessment of sediment transport for four dams on the Kalamazoo River between Plainwell and Allegan, Michigan. U.S. Geological Survey Scientific Investigations Report 2004-5178. 41 p.

Table 2-1
Summary of Sample Types and Locations (Former Powerhouse Discharge Channel)

Type of Sample	Assumed Location	Purpose
Surface Water Quality	Immediately upstream or near the Plainwell Spillway. Mid depth in the water column.	Establish background conditions for turbidity comparisons.
	Approximately 200 and 300 feet downstream of the former powerhouse discharge channel. Sample within the channel may be collected from pier or boat depending upon flow conditions. Mid-depth in the water column.	Establish water quality during removal activities.
	Groundwater collection sump (or equivalent) within isolated removal area (discharge water).	Measure turbidity for comparison to background conditions and determination of discharge location.
Surface Water Flow Measurements	To be determined if needed.	To be determined if needed.
Water Treatment System Monitoring	Effluent sampling from Portable Treatment unit.	To confirm treatment system effectiveness.
Sediment Sampling	At selected nodes within a final sampling grid. Grid size depends upon the final size of the removal area. Node selections will consider random and spatially distributed locations. Samples will be collected within the top 6 inches of sediment.	Document PCB sediment concentrations after removal is complete.
Geoprobe Soil Sampling	Predesign sample collection at transects along the edge of the landfill closest to the former powerhouse discharge channel.	Determine possible existence of former berm at edge of landfill and assess collected soil samples for implications on slope stability.

Table 2-2
Summary of Sample Types and Locations
(Plainwell Mill Banks)

Type of Sample	Assumed Location	Purpose
Surface Water Quality	Immediately upstream or near the Plainwell Mill banks. Mid depth in the water column.	Establish background conditions for turbidity comparisons. Turbidity will be measured hourly.
	Approximately 200 and 300 feet downstream of the Plainwell Mill banks. Sample within the channel may be collected from pier or boat depending upon flow conditions. Mid-depth in the water column.	Establish water quality during removal activities. Turbidity will be measured hourly
Surface Water Flow Measurements	To be determined if needed.	To be determined if needed.
Water Treatment System Monitoring	Effluent sampling from Portable Treatment unit.	To confirm treatment system effectiveness.
Sediment Sampling	At selected nodes within a final sampling grid. Grid size depends upon the final size of the removal area. Node selections will consider random and spatially distributed locations. Samples will be collected within the top 6 inches of sediment.	Document PCB sediment concentrations after removal is complete.
Soil Sampling	At selected nodes within a final sampling grid. Grid size depends upon the final size of the removal area. Node selections will consider random and spatially distributed locations. Samples will be collected within the top 6 inches of soil.	Document PCB soil concentrations after removal is complete.

Table 2-3
Summary of Sample Types and Locations
(Predesign Investigations for the Remedial Design for the 12th Street Landfill)

Type of Sample	Assumed Location	Purpose
Test Pits (visual)(1)	***Wetland Area to the North of the Landfill*** - Advance approximately 3 test pits to confirm the approximate areal extent of visible paper residuals beyond the toe of the landfill. ***Quarry/State Properties*** **-** Advance approximately 3 test pits within the quarry property and approximately 4 test pits within the State property to delineate the areal extent and the depth of visible paper residuals.	***Wetland Area to the North of the Landfill*** - Evaluate potential constructibility issues in the wetland, and to assess the degree of difficulty in distinguishing the visible paper residuals from the native soil. ***Quarry/State Properties*** - Support discussions with the owners of these adjacent properties concerning access for implementation of the Remedial Action.
Geoprobe® Borings (visual)	Advance approximately 9 Geoprobe® borings into the 12th Street Landfill at select locations where fill material is believed to extend beyond the property boundary to the southwest and to the southeast and a minimum of 2 Geoprobe® borings near the southern end of the landfill. The borings will be advanced to approximately 5 feet into the native soil underlying the fill, or to refusal.	Better estimate the depth of the paper residuals along the property boundaries with 12th Street, the quarry to the southwest, and with the State property to the southeast, in order to reduce uncertainties in designing the final landfill grades.
Gas Monitoring	Measure gas concentrations (methane, oxygen, and carbon dioxide) and pressures at the existing groundwater monitoring wells screened in the vadose zone (MW-6A, MW-7A, and MW-8A). In addition, measure gas concentrations at each Geoprobe® boring used to better estimate the depth of the paper residuals along the property boundaries to the southwest and to the southeast.	To collect readily accessible information about the subsurface landfill gas conditions at the 12th Street Landfill that may be useful in designing a passive gas venting system.

Note:
(1) In the event that in-field conditions limit the use of test pit excavating equipment (e.g., a backhoe), other tools, such as hand augers or shovels, may be used instead.

LEGEND

PROPERTY BOUNDARIES

0 1,000 2,000 4,000 FEET

N

1 INCH EQUALS 2,000 FEET

1:24,000

PROJECT LOCATION

BASE MAP FROM USGS 7.5 MINUTE QUADRANGLE, OSTEGO, 1967, REVISED 1973.

RMT
744 Heartland Trail
Madison, WI 53717 - 1934
P.O. Box 8923
Madison, WI 53708 - 8923
Phone: 608-831-4444
Fax: 608-831-3021

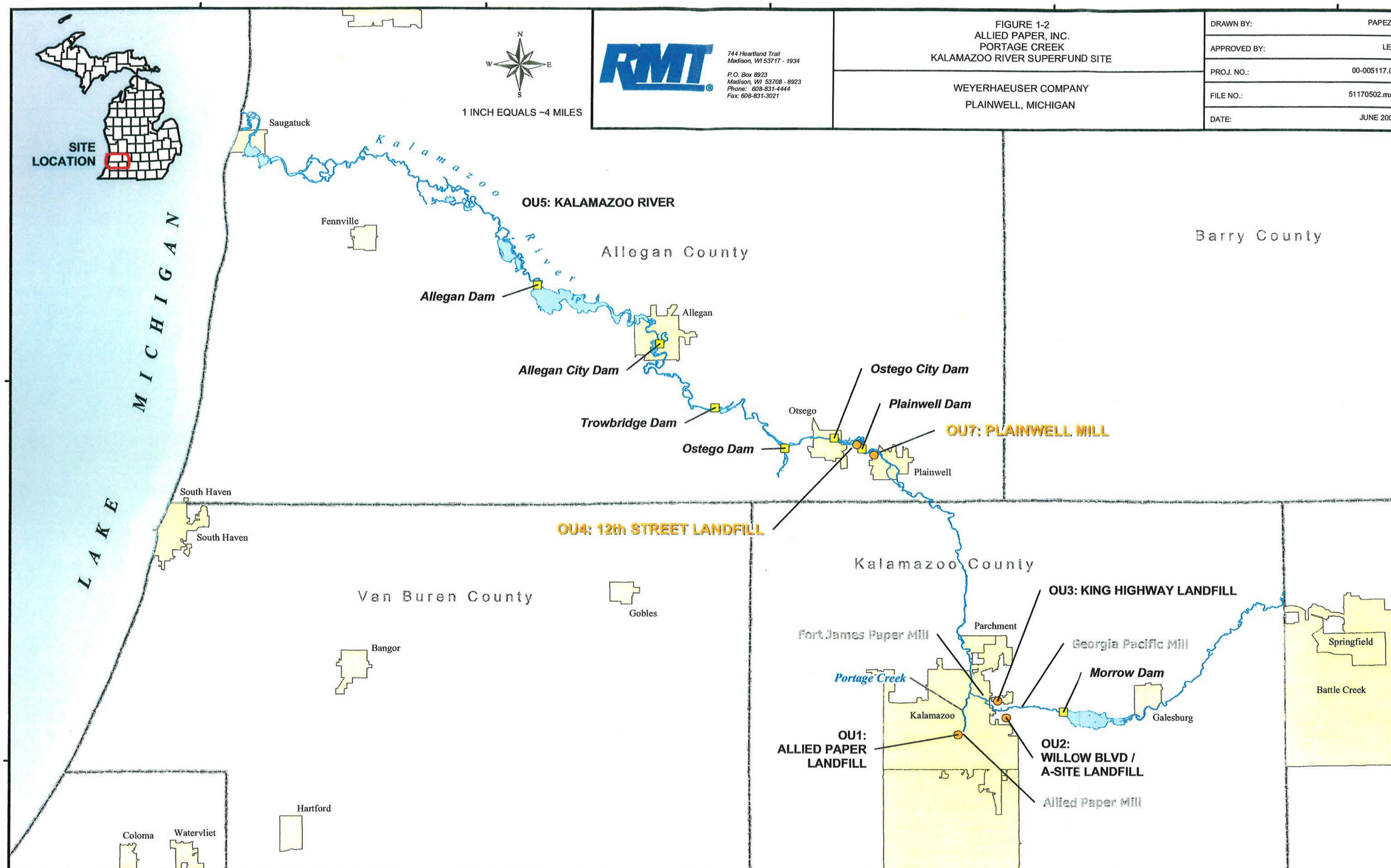
SITE LOCATION MAP

WEYERHAEUSER COMPANY
PLAINWELL, MICHIGAN

DRAWN BY:	PAPEZ J
APPROVED BY:	LEH
PROJ. NO.:	00-005117.05
FILE NO.:	51170501.mxd
DATE:	JUNE 2007

D:\05117\05\GIS\51170501.mxd 6/19/2007 11:24:36

FIGURE 1-1



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Appendix A
Standard Operating Procedures

Standard Operating Procedure F-1
Water Sampling and Field Measurement Procedures

This standard operating procedure (SOP) sets forth the field procedures for the collection of water column samples via boat, sampling from shore, or sampling from a bridge. Water column samples will be collected using a stainless steel Kemmerer water sampler, utilizing a peristaltic pump with Teflon tubing, or using an ISCO automated sampler. Samples collected downstream of construction to monitor TSS and PCB transport will utilize an ISCO automated sampler. Treated water from construction activities will be obtained using a direct grab sampling method.

Decontamination Procedures for Nondedicated Sampling Equipment

Proper decontamination of sampling equipment is essential to minimize the possibility of cross-contamination of samples. Nondedicated equipment used for sampling various environmental media (soil, groundwater, surface water, etc.) will be cleaned before its initial use in the field and again before use at each subsequent sampling site.

All nondedicated sampling equipment will be new, or will be decontaminated at RMT prior to its initial use on-site. Decontamination procedures will include the following steps:

1. Wash the equipment in a nonphosphate detergent.
2. Rinse with potable tap water.
3. Rinse with deionized (DI) or distilled water.

The submersible pumps are not designed to withstand acid rinsing. Decontamination of this equipment will therefore consist of washing the downhole portions of the equipment with nonphosphate detergent and rinsing with DI or distilled water.

Nondedicated equipment that is to be used at additional locations at the site will be field-decontaminated between sampling locations. Details regarding the decontamination of field equipment is included in the sampling procedures described below. The field decontamination procedures will be in accordance with the Michigan Department of Environmental Quality (MDEQ) Remediation and Redevelopment Division Operation Memorandum Number 2, Attachment 7 (MDEQ, 2004).

The field decontamination of sampling equipment will take place at the sampling location. All decontamination water will be contained in 5-gallon buckets and transported to the decontamination pad for collection with other decontamination wastewater.

The field equipment blanks will be collected in accordance with the sampling methodology specified in Attachment 7 (MDEQ, 2004).

To the extent practicable, single-use sampling equipment and materials will be used for the collection of all environmental samples. The materials used will be new and clean, and will be placed in plastic for transport to the site. Once used, this equipment will be placed in plastic bags and managed as investigation-derived waste material.

Water Column Sampling Procedures

Water column samples will be collected using a stainless steel Kemmerer water sampler, a peristaltic pump with Teflon tubing, or a discrete grab sample in appropriate sample containers. The sample collection method will be determined based on river flow, water depth, and site conditions at the time of collection. The Kemmerer sample collection device is lowered to the appropriate sample depth on a cable in an open position and a weighted messenger is sent along the cable to trip the sampler closed. The peristaltic pump with disposable silicone pump tubing and Teflon sample tubing is lowered to depth and directly pumps water from the river. Grab sample collection is utilized for shallow water river conditions or when collecting water out of a sample port for water treatment system evaluation.

Prior to initiating field activities, the water quality meter will be calibrated according to the manufacturer's instructions and the calibration data recorded in the logbook or on the Water Quality Meter Calibration Log. The procedures for collection of water column samples are provided below.

1. Record the sample location on the sample log or in field notebook along with other appropriate information [include a sketch indicating location relative to shore features, if appropriate].
2. Don health and safety equipment (as required by the Multi-Area HSP).
3. Decontamination of the sampling equipment prior to initial use, between sampling at each transect, and at the completion of sampling as follows: distilled water rinse; acetone rinse; hexane triple rinse; and distilled water triple rinse. All decontamination rinsate water will be contained in a MDOT-approved container. If using a peristaltic pump with disposable tubing or a discrete grab sample into appropriate lab supplied glassware, no equipment cleaning is needed.
4. Prepare one rinse-blank sample prior to and after sampling activities, by pouring deionized water supplied by the laboratory through the cleaned Kemmerer and filling the sample containers as described in Steps 8 and 9. If a peristaltic pump and Teflon tubing or a discrete grab sample is used, no rinse blanks are required.
5. Measure the total depth of the water column. Initial field checks with a survey rod will be performed to confirm accuracy.
6. Lower the water sampler to 0.8 times the total water column depth and either release the trigger on the Kemmerer, start peristaltic pump, or lower sample bottle.
7. Raise the water sampler from the water column with minimal disturbance, continue to pump river water, or secure grab sample jars.
8. Remove the covers from the appropriate laboratory supplied containers and slightly tilt the mouth of the container below the sampling device.
9. Empty the sampler slowly, allowing the sample stream to flow gently down the side of the sample container (with minimal entry turbulence).

10. Repeat Steps 6 through 9 for collection of sample at 0.2 times the total water column depth.
11. Repeat Steps 5 through 10 at the other river locations.
12. At each station, collect field measurements for temperature, pH, turbidity, conductivity, and DO at 0.2 and 0.8 times the total water column depth record results on the appropriate in the field logbook or Surface Water Sampling Log.
13. Secure all sample jar caps tightly.
14. Label all sample containers.
15. Place filled sample containers on ice in a cooler.
16. Collect field duplicate and matrix spike (MS) and matrix spike duplicate (MSD) samples during each sampling event. Field duplicates and MS/MSD samples will be prepared by filling additional sets of sample containers with water collected at the same time and depth. One additional set of sample containers will be filled for field duplicates and two sets of containers will be filled for MS/MSD samples.
17. Follow procedures for preservation of samples and packing, handling, and shipping with associated chain-of-custody procedures for samples
18. Record required information in the field logbook or Surface Water Sampling Log.

Continuous Water Column Sampling Procedures During Construction

Three movable YSI Sonde units, each equipped with probes to measure dissolved oxygen, turbidity, pH, conductivity, and temperature will be used upstream and two locations downstream of the construction area. The YSI logs the above data at predetermined time intervals. The unit will be programmed to sample hourly during construction operations. The data will be downloaded daily onto a computer hard drive for backup.

Calibration Procedures - The YSI will be calibrated weekly in accordance with manufacturer's instructions. Calibration information will be recorded in the field logbook.

Operation Procedures - The YSI will be operated according to the manufacturer's instructions.

Maintenance Procedures - The YSI will be maintained according to the manufacturer's instructions. Maintenance information will be recorded in the field logbook. A replacement meter and probes will be available onsite or ready for overnight shipment, as necessary.

The units will be placed within a perforated PVC pipe for protection and anchored to the river bottom. A buoy will be attached to the PVC pipe for accessibility, and the unit attached to shore for security. In addition to the Sonde units, a sampling line will also connected to tubing which feed to an ISCO sampler located on shore for discreet sampling of the water throughout the construction activities. Samples will be taken every 15 minutes during material placement.

The water sample that corresponds to the highest turbidity reading over the placement period should be submitted to WATS laboratory for analysis of Total Suspended Solids (TSS), Volatile Suspended Solids (VSS) and polychlorinated biphenyls (PCBs).

Collection Procedures - The procedures for collection of water column samples using the YSI and ISCO sampler are provided below.

1. Record the sample location on the sample log or in field notebook along with other appropriate information [include a sketch indicating location relative to shore features, if appropriate].
2. Measure the total depth of the water column at mid-river location using a portable depth finder. Initial field checks with a survey rod will be performed to confirm accuracy.
3. Place Sonde unit and ISCO intake tubing at a mid-river location, if possible. Attach the tubing to the upstream side of the monitoring using cable ties. Depending upon site conditions, placement of a station at mid-river may not be safe or feasible. In this event, water samples may be collected from a pier or boat.
4. Set the ISCO composite sampler and portable power source on shore and attach to an immovable object (tree, fence, etc) to deter theft/vandalism.
5. Place necessary glassware in the sampler and surround glassware with up to 20 pounds of ice.
6. Attach the intake tubing to the tubing in the pump head. Ensure that the tubing slopes downhill from the pump head to the intake point to ensure draining between sampling events.
7. Program the sampler according the manufacturers instructions including two rinse cycles prior to collection. Set the appropriate sample time and volume to fill an individual container. Ensure that the sampler is in "Run" mode prior to leaving the sampler. Close the top of the sampler for protection against the elements.
8. Retrieve the sample containers from the ISCO sampler upon completion of the timed sampling event.
9. Download the information from the Sonde unit for the timed sampling event.
10. Match the highest turbidity readings from the Sonde unit with the corresponding ISCO sample.
11. Remove the covers from the appropriate laboratory supplied containers and slightly tilt the mouth of the container below the ISCO sample container.
12. Empty the sample container slowly, allowing the sample stream to flow gently down the side of the laboratory supplied sample container (with minimal entry turbulence).
13. Secure all sample jar caps tightly.
14. Label all sample containers.
15. Place filled sample containers on ice in a cooler.
16. Collect field duplicate and matrix spike (MS) and matrix spike duplicate (MSD) samples during each sampling event or as required. Field duplicates and MS/MSD samples will be prepared by filling additional sets of sample containers with water collected at the same time and depth. One additional set of sample containers will be filled for field duplicates and two sets of containers will be filled for MS/MSD samples.
17. Follow procedures for preservation of samples and packing, handling, and shipping with associated chain-of-custody procedures for samples.

18. Record required information on the field logbook or Surface Water Sampling Log.
19. Follow appropriate decontamination procedures describe above for the sample equipment as necessary.

Standard Operating Procedure F-2
Surface Water Flow Measurement Procedures

This standard operating procedure (SOP) describes the field procedures for determining surface water flow at a river transect. In general, these procedures include dividing the width of the channel conveying flow into segments and measuring the average velocity and cross-sectional area of each segment. The total flow is then calculated as the sum of the product of average flow velocity and cross-sectional area of each segment.

Decontamination Procedures for Sampling Equipment

Proper decontamination of sampling equipment is essential to minimize the possibility of cross-contamination of samples. Nondedicated equipment used for sampling various environmental media (soil, groundwater, surface water, etc.) will be cleaned before its initial use in the field and again before use at each subsequent sampling site.

All nondedicated sampling equipment will be new, or will be decontaminated at RMT prior to its initial use on-site. Decontamination procedures will include the following steps:

1. Wash the equipment in a nonphosphate detergent.
2. Rinse with potable tap water.
3. Rinse with deionized (DI) or distilled water.

The submersible pumps are not designed to withstand acid rinsing. Decontamination of this equipment will therefore consist of washing the downhole portions of the equipment with nonphosphate detergent and rinsing with DI or distilled water.

Nondedicated equipment that is to be used at additional locations at the site will be field-decontaminated between sampling locations. Details regarding the decontamination of field equipment is included in the sampling procedures described below. The field decontamination procedures will be in accordance with the Michigan Department of Environmental Quality (MDEQ) Remediation and Redevelopment Division Operation Memorandum Number 2, Attachment 7 (MDEQ, 2004).

The field decontamination of sampling equipment will take place at the sampling location. All decontamination water will be contained in 5-gallon buckets and transported to the decontamination pad for collection with other decontamination wastewater.

The field equipment blanks will be collected in accordance with the sampling methodology specified in Attachment 7 (MDEQ, 2004).

To the extent practicable, single-use sampling equipment and materials will be used for the collection of all environmental samples. The materials used will be new and clean, and will be placed in plastic for transport to the site. Once used, this equipment will be placed in plastic bags and managed as investigation-derived waste material.

Surface Water Flow Measurement Procedures

The general procedures to be followed when obtaining surface water flow measurements at a river or creek transect are described below.

The following materials will be available, as required, during water column sampling:

- health and safety equipment to be worn when working around surface water, as described in the Multi-Area Health and Safety Plan (HSP)
- field notebook and pen
- calculator
- rope
- survey rod
- duct tape
- 200-foot measuring tape
- electromagnetic velocity meter

Surface Water Flow Measurement Sampling Procedures

The following procedures will be used to determine the velocity profile at a cross-section:

1. Measure the width of the water body, then divide and mark into equally spaced measurement locations. For water bodies less than 30 feet in width, the spacing should be 5 feet. For water bodies between 30 feet and 100 feet in width, the spacing should be 10 feet. For water bodies greater than 100 feet in width, the spacing should be 20 feet.
2. Calibrate the velocity meter according to manufacturer's specifications.
3. Lower the survey rod and measure and record the water depth to the nearest 0.1 foot at each measurement location in the field logbook or on the Velocity Profile Measurement Log. Measurements should be collected at the center of each 5-foot (or 10- or 20-foot) increment.
4. Velocities will be determined using the two-point method. Attach the velocity meter probe to the survey rod, measure and record the velocity in feet per second at depths equaling 0.2 and 0.8 times the total depth at each measurement location. Average the two velocity measurements to obtain the average velocity for that vertical section. Record all measurements in the field logbook or on the Velocity Profile Measurement Log.

5. Calculate the average total flow by multiplying the average velocity reading times the cross-sectional area of the 5-foot (or 10- or 20-foot) increment. The cross-sectional area is determined by multiplying the width of the increment (*i.e.*, 5, 10, or 20 feet) times the average water depth within that increment. The total flow is the sum of the velocity times the area for each increment and can be calculated using the following formula:

$$QT = V1\ A1 + V2\ A2 + ... + Vn\ An$$

where:

QT = Total flow in cubic feet per second

V1-n = Average velocity for a vertical section (feet per second)

A1-n = Cross-sectional area of each increment (square feet)

6. For flow measurements at bridges, water surface will be measured using a weighted rope or tape measure as a "tape down" distance from a distinct reference point on the bridge.
7. Surface water flow measurement locations and "tape down" locations will be recorded in a field notebook sketch as appropriate.
8. Conduct appropriate decontamination procedures described above.

Standard Operating Procedure F-3
Water Treatment System Monitoring Procedures

This standard operating procedure (SOP) describes the field procedures for collection of in-field water treatment system measurements including grab samples for PCB analysis at the influent, intermediate stage and effluent of the water treatment system, grab samples for TSS at the effluent of the water treatment system and grab samples for phosphorus at the effluent of the water treatment system.

Decontamination Procedures for Sampling Equipment

Proper decontamination of sampling equipment is essential to minimize the possibility of cross-contamination of samples. Nondedicated equipment used for sampling various environmental media (soil, groundwater, surface water, etc.) will be cleaned before its initial use in the field and again before use at each subsequent sampling site.

All nondedicated sampling equipment will be new, or will be decontaminated at RMT prior to its initial use on-site. Decontamination procedures will include the following steps:

1. Wash the equipment in a nonphosphate detergent.
2. Rinse with potable tap water.
3. Rinse with deionized (DI) or distilled water.

Nondedicated equipment that is to be used at additional locations at the site will be field-decontaminated between sampling locations. The field decontamination procedures will be in accordance with the Michigan Department of Environmental Quality (MDEQ) Remediation and Redevelopment Division Operation Memorandum Number 2, Attachment 7 (MDEQ, 2004).

To the extent practicable, single-use sampling equipment and materials will be used for the collection of all environmental samples. The materials used will be new and clean, and will be placed in plastic for transport to the site. Once used, this equipment will be placed in plastic bags and managed as investigation-derived waste material.

Water Treatment System Monitoring Procedures

Grab samples of surface water will be collected at a specified frequency during the response activities for PCB analysis. Surface water samples will be collected from the influent, at the intermediate stage and at the effluent of the water treatment system. Surface water grab samples will be collected at the effluent of the water treatment system for phosphorus and TSS monitoring at a specified frequency during the response activities. Turbidity measurements will also be collected during the water treatment system operation activities. The general procedures to be followed when the surface water grab samples are collected or measurements taken are outlined below. Specific analytical methods are described in the QAPP.

The procedures for collection of water treatment system grab samples are provided below.

1. Record the surface water grab sample location (*i.e.* effluent, influent) on the sample log or in field notebook along with other appropriate information [include a sketch indicating location of sample relative to the water treatment system].
2. Don health and safety equipment (as required by the Multi-Area HSP).
3. Collect the grab samples by quickly immersing the specified sample container with the mouth of the container pointing towards the influent.
4. Raise the sample jar from the water with minimal disturbance and secure the jar.
5. At each station, collect field measurements for temperature, pH, turbidity, conductivity, and DO and record results in the field logbook or Surface Water Sampling Log.
6. Secure all sample jar caps tightly.
7. Label all sample containers.
8. Place filled sample containers on ice in a cooler.
9. Collect field duplicate and matrix spike (MS) and matrix spike duplicate (MSD) samples during each sampling event. Field duplicates and MS/MSD samples will be prepared by filling additional sets of sample containers with water collected at the same time and depth. One additional set of sample containers will be filled for field duplicates and two sets of containers will be filled for MS/MSD samples.
10. Follow procedures for preservation of samples and packing, handling, and shipping with associated chain-of-custody procedures for samples.
11. Follow appropriate decontamination procedures described above.
12. Record required information in the field logbook or Surface Water Sampling Log.

Standard Operating Procedure F-4
Sediment Sampling

This standard operating procedure (SOP) is applicable to the collection of representative sediment samples. The methodologies discussed in this SOP are applicable to the sampling of sediment in both flowing and standing water. They are generic in nature and may be modified in whole or part to meet the handling and analytical requirements of the contaminants of concern, as well as the constraints presented by site conditions and equipment limitations. Modifications of sampling methodologies will be documented in the appropriate field logbook and discussed in reports summarizing field activities and analytical results. For the purposes of this procedure, sediments are those mineral and organic materials situated beneath an aqueous layer.

Method Summary

Sediment samples may be collected using a variety of methods and equipment, depending on the depth of the water, the portion of the sediment profile required (surface vs. subsurface), the type of sample required (disturbed vs. undisturbed), contaminants present, and sediment type. Sediment is collected from beneath the water either directly, using a hand held device such as a shovel, trowel, or auger; or indirectly, using a device such as an Ekman or Ponar dredge. Following collection, sediment is transferred from the sampling device to a sample container of appropriate size and construction for the analyses requested. If composite sampling techniques are employed, multiple grabs are placed into a container constructed of inert material, homogenized, and transferred to sample containers appropriate for the analyses requested.

Equipment/Apparatus

Equipment needed for collection of sediment samples may include:

- Maps/plot plan
- Safety equipment
- Compass
- Tape measure
- Survey stakes, flags, or buoys and anchors
- Camera and film
- Stainless steel, plastic, or other appropriate composition bucket
- 4-oz., 8-oz., and one-quart wide mouth jars w/Teflon lined lids
- Ziploc plastic bags
- Logbook
- Sample jar labels

- Chain of Custody records, field data sheets
- Cooler(s)
- Ice
- Decontamination supplies/equipment
- Spade or shovel
- Spatula
- Scoop
- Trowel
- Bucket auger
- Tube auger
- Extension rods
- "T" handle
- Sediment coring device (tube, suction head, extension rods, "T" handle)
- Ponar dredge
- Ekman dredge
- Nylon rope or steel cable
- Messenger device

Decontamination Procedures

Decontamination Prior to Sampling

Proper decontamination of sampling equipment is essential to minimize the possibility of cross-contamination of samples. Nondedicated equipment used for sampling various environmental media (soil, groundwater, surface water, etc.) will be cleaned before its initial use in the field and again before use at each subsequent sampling site.

All nondedicated sampling equipment will be new, or will be decontaminated at RMT prior to its initial use on-site. Decontamination procedures will include the following steps:

1. Wash the equipment in a nonphosphate detergent.
2. Rinse with potable tap water.
3. Rinse with deionized (DI) or distilled water.

To the extent practicable, single-use sampling equipment and materials will be used for the collection of all environmental samples. The materials used will be new and clean, and will be placed in plastic for transport to the site. Once used, this equipment will be placed in plastic bags and managed as investigation-derived waste material.

In-Field Sampling Decontamination Procedures

As described above, this sampling protocol describes multiple methods for sediment sample collection. The decontamination procedures described below will be relied upon in the field as appropriate for equipment decontamination.

Nondedicated equipment that is to be used at additional locations at the site will be field-decontaminated between sampling locations. Details regarding the decontamination of field equipment is included in the section below. The field decontamination procedures will be in accordance with the Michigan Department of Environmental Quality (MDEQ) Remediation and Redevelopment Division Operation Memorandum Number 2, Attachment 7 (MDEQ, 2004).

The field decontamination of sampling equipment will take place at the sampling location. All decontamination water will be contained in 5-gallon buckets and transported to the decontamination pad for collection with other decontamination wastewater.

The field equipment blanks will be collected in accordance with the sampling methodology specified in Attachment 7 (MDEQ, 2004).

Sample Collection

Selection of a sampling device is most often contingent upon: 1) the depth of water, and 2) the physical characteristics of the sediment to be sampled. The following procedures may be utilized:

Sampling Surface Sediment with a Trowel or Scoop

The sampling method is accomplished by wading into the surface water body and while facing upstream (into the current), scooping the sample along the bottom of the surface water body in the upstream direction. Excess water may be removed from the scoop. However, this may result in the loss of some fine particle size material associated with the bottom of the surface water body.

This method can be used to collect consolidated sediments but is limited somewhat by the depth of water. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sample team member. In surface water bodies that are too deep to wade, but less than eight feet deep, a stainless steel scoop or spoon attached to a piece of conduit can be used either from the banks if the surface water body is narrow or from a boat. The sediment is placed into a glass pan and homogenized.

A stainless steel scoop or lab spoon will suffice in most applications. Follow these procedures to collect sediment samples with a stainless steel scoop:

1. Using a precleaned stainless steel scoop, remove the desired thickness of sediment from the sampling area.
2. Transfer the sample into an appropriate sample or homogenization container.

Sampling Surface Sediment with a Bucket Auger or Tube Auger

This system consists of an auger, a series of extension rods, and a "T" handle. The auger is driven into the sediment and used to extract a core. A sample of the core is taken from the appropriate depth.

Use the following procedure to collect sediment samples with a thin-walled auger:

1. Insert the auger into the material to be sampled at a 0° to 45° angle from vertical. This orientation minimizes spillage of the sample from the sampler. Extraction of samples may require tilting of the sampler.
2. Rotate the auger once or twice to cut a core of material.
3. Slowly withdraw the auger, making sure that the slot is facing upward.
4. An acetate core may be inserted into the auger prior to sampling, if characteristics of the sediments or body of water warrant. By using this technique, an intact core can be extracted.
5. Transfer the sample into an appropriate sample or homogenization container.

Sampling Surface Sediment with a Ponar Dredge

The Ponar dredge uses a self-tripping sampler featuring hinged jaws and a spring loaded pin that releases when the sampler makes impact with the bottom. The top is covered with a stainless steel screen with neoprene rubber flaps which allows water to flow through for a controlled descent and less interference with the sample.

Follow these procedures for collecting sediment with a Ponar dredge:

1. Attach a sturdy nylon or steel cable to the hook provided on top of the dredge.
2. Arrange the Ponar dredge sampler in the open position, setting the trip bar so the sampler remains open when lifted from the top.
3. Slowly lower the sampler to a point just above the sediment.
4. Drop the sampler sharply into the sediment, then pull sharply up on the line, thus releasing the trip bar and closing the dredge.
5. Raise the sampler to the surface and slowly decant any free liquid through the screens on top of the dredge. Be careful to retain fine sediments.
6. Open the dredge and transfer the sediment to a stainless steel or plastic bucket. Continue to collect additional sediment until sufficient material has been gained. Thoroughly mix sediment to obtain a homogeneous sample, and then transfer to the appropriate sample container.

Sampling Subsurface Sediment with a Coring Device

Core samplers are used to sample vertical columns of sediment. They are particularly useful when a historical picture of sediment deposition is desired since they preserve the sequential layering of the deposit, and when it is desirable to minimize the loss of material at the sediment-water interface.

Follow these procedures when using a sample coring device to collect subsurface sediments. It consists of a coring device, handle, and acetate core barrel:

1. Assemble the coring device by inserting the core into the sampling tube assembly.
2. Insert the "vacuum plug" into the tip of the sampling tube with the wire connected through the top portion of sampling equipment.
3. Tighten the plug so the fit is snug within the tube.
4. Tighten the rubber fitting, associated with the sampling equipment, around the top end of the tube.
5. Screw the handle onto the upper end of the sampling tube and add extension rods as needed.
6. Place the sampler in a perpendicular position on the material to be sampled.
7. With left hand holding the wire (connected to the plug inside the core assembly), place downward pressure on the sampler into the material to the desired depth. Do not allow the plug to proceed deeper (hold left hand at constant elevation, while advancing core with right hand).
8. Place downward pressure on the device until the desired depth is reached.
9. Withdraw the sampler by puling the sampling assembly upwards, until the bottom of the core can be reached below the surface of the water.
10. Place cap on core, while end of the core is still underneath the water's surface.
11. Remove core from water and loosen rubber fitting.
12. Remove core from sampling equipment and place an additional cap on top of core (it may be appropriate to reduce the core length prior to capping the core).
13. The sample may be used in this fashion, or the contents transferred to a stainless steel or plastic bucket and mixed thoroughly to obtain a homogeneous sample representative of the entire sampling interval.

Sediment Probing and Bathymetric Survey

The metal calibration rod will be used to probe sediment depths along the sediment characterization transects. From a boat, at each station, the water depth to top of sediment will be measured by probing with a surveyor's rod. The sediment depth will then be measured by pushing a calibrated 5/8-inch galvanized hollow pipe into the sediment until refusal using reasonable human force. The depth of the penetrated sediment will be noted by subtracting the length of the rod above the water surface and the water depth at the point being probed from the length of the entire rod. Measurements made of location, depth, time, and field samples will be noted by subtracting the length of the rod above the water surface and the water depth at the point being probed from the length of the entire rod. Measurements made of location (using a GPS unit, if applicable), depth, time, and field samples will be noted in the field logbook.

References

Mason, B.J. Preparation of Soil Sampling Protocol: Technique and Strategies. 1983 EPA-600/4-83-020.

Barth, D.S. and B.J. Mason. Soil Sampling Quality Assurance User's Guide. 1984 EPA-600/4-84-043.

U.S. EPA. Characterization of Hazardous Waste Sites - A Methods Manual: Volume II. Available Sampling Methods, Second Edition. 1984 EPA Hazardous Waste Streams. 1980 EPA-600/2-80-018.

Field Sampling Guidance Document #1215 – Sediment Sampling, U.S. EPA Region 9 Laboratory Richmond California. 1999.

Sediment Sampling SOP #2016. U.S. EPA. 1994.

Standard Operating Procedure F-5
Soil Sampling with Direct Push Sampler

The primary means for the collection of subsurface soil samples will be a direct-push technique using a Geoprobe® or equivalent driver. Direct-push soil samples will be obtained using a closed-piston soil sampler with a liner (or equivalent sampling system). The Sampler will be operated in accordance with the manufacturer's recommended operating procedures for the type of equipment used.

Soil samples will be collected at predetermined intervals based on specific data needs. The samples will be classified in accordance with the Unified Soil Classification System (USCS), and field logs will be prepared. A summary of the USCS is attached to this procedure.

Small subsamples representative of the major soil types will be retained for use in developing visual classification as described later in this subsection, and for physical testing, as required.

Subsamples selected for laboratory analysis will be placed in appropriate sample containers provided by the analytical laboratory, labeled, placed in an iced cooler, and stored in accordance with chain-of-custody requirements specified in the QAPP until shipment to the laboratory (or laboratories) is arranged. Chain-of-Custody Records will be completed for all samples according to the methods described in the QAPP.

Geoprobe® and support equipment will not come in direct contact with the samples, so cross-contamination of samples is not a concern. However, this equipment will likely come in contact with impacted soil and must therefore be decontaminated prior to moving from one location to another.

The Geoprobe® equipment used for soil sampling and monitoring well installation will be cleaned with high-pressure/hot water washing equipment prior to initiating the field investigation. The same procedure will be applied to all drilling equipment between each boring location. The cleaning will occur at a decontamination pad constructed at a suitable location(s) at the site. Water used for cleaning will be obtained from a local potable water source. Equipment subject to these decontamination procedures includes, but is not limited to, the following:

- Direct Push drill rig
- Direct Push sampler components

In addition, downhole equipment that comes in direct contact with samples will be decontaminated between each sample interval. This procedure will include washing with a nonphosphate detergent and rinsing with clean potable water.

A piece of Direct Push equipment that comes in direct contact with soil samples (*e.g.*, split-barrel samplers) will be selected for collection of one field equipment blank. After the equipment has been cleaned, it will be rinsed with DI water. The rinse water will be collected and submitted for analysis of all constituents for which the normal samples collected with the equipment are being analyzed.

Standard Operating Procedure F-6
Surficial Soil Sampling

This standard operating procedure (SOP) is applicable to the collection of representative soil samples. The methodology is generic in nature and may be modified in whole or part to meet the handling and analytical requirements of the contaminants of concern, as well as the constraints presented by site conditions and equipment limitations. Modifications of sampling methodologies will be documented in the appropriate field logbook and discussed in reports summarizing field activities and analytical results. For the purposes of this procedure, soils are those mineral and organic materials not submerged in water for an extended period of time sufficient to support aquatic life.

Equipment/Apparatus

Equipment needed for collection of soil samples may include:

- Maps/plot plan
- Safety equipment
- Compass
- Tape measure
- Survey stakes, flags,
- Camera and film
- Stainless steel, plastic, or other appropriate composition bucket
- 4-oz., 8-oz., and one-quart wide mouth jars w/Teflon lined lids
- Ziploc plastic bags
- Logbook
- Sample jar labels
- Chain of Custody records, field data sheets
- Cooler(s)
- Ice
- Decontamination supplies/equipment
- Spade or shovel
- Spatula
- Scoop
- Trowel

Decontamination Procedures

Decontamination Prior to Sampling

Proper decontamination of sampling equipment is essential to minimize the possibility of cross-contamination of samples. Nondedicated equipment used for sampling various environmental media (soil, groundwater, surface water, etc.) will be cleaned before its initial use in the field and again before use at each subsequent sampling site.

All nondedicated sampling equipment will be new, or will be decontaminated at RMT prior to its initial use on-site. Decontamination procedures will include the following steps:

1. Wash the equipment in a nonphosphate detergent.
2. Rinse with potable tap water.
3. Rinse with deionized (DI) or distilled water.

To the extent practicable, single-use sampling equipment and materials will be used for the collection of all environmental samples. The materials used will be new and clean, and will be placed in plastic for transport to the site. Once used, this equipment will be placed in plastic bags and managed as investigation-derived waste material.

In-Field Sampling Decontamination Procedures

As described above, this sampling protocol describes multiple methods for soil sample collection. The decontamination procedures described below will be relied upon in the field as appropriate for equipment decontamination.

Nondedicated equipment that is to be used at additional locations at the site will be field-decontaminated between sampling locations. Details regarding the decontamination of field equipment are included in the section below. The field decontamination procedures will be in accordance with the Michigan Department of Environmental Quality (MDEQ) Remediation and Redevelopment Division Operation Memorandum Number 2, Attachment 7 (MDEQ, 2004).

The field decontamination of sampling equipment will take place at the sampling location. All decontamination water will be contained in 5-gallon buckets and transported to the decontamination pad for collection with other decontamination wastewater.

The field equipment blanks will be collected in accordance with the sampling methodology specified in Attachment 7 (MDEQ, 2004).

Sample Collection

Sampling Surface Soil with a Trowel or Scoop

The sampling method is accomplished by scooping the soil sample along the top 6 inches of the surface with a stainless steel scoop. Accurate, representative samples can be collected with this procedure depending on the care and precision demonstrated by the sample team member. Once collected, the sample is placed in a glass or stainless still bowl and homogenized.

A stainless steel scoop or lab spoon will suffice in most applications. Follow these procedures to collect soil samples with a stainless steel scoop:

1. Using a precleaned stainless steel scoop, remove the desired thickness of soil from the sampling area.
2. Transfer the sample into an appropriate sample or homogenization container.

Standard Operating Procedure F-7
Landfill Gas Monitoring

This standard operating procedure (SOP) is applicable to landfill gas monitoring. The methodology is generic in nature and may be modified in whole or in part to meet the constraints presented by site conditions and equipment limitations. Modifications of monitoring methodologies will be documented in the appropriate field logbook and discussed in reports summarizing field activities and monitoring results.

Equipment

Equipment needed for landfill gas monitoring may include the following:

- Portable combustible gas meter
- Pressure gauges with varying sensitivity ranges
- Site plan
- Logbook
- Field data sheets
- Safety equipment

Targeted Compounds and Measurements

As readily accessible, the gas composition will be monitored in groundwater monitoring wells and Geoprobe® borings using a portable combustible gas meter (e.g., a Landtec®, or equivalent). The instrument selected will directly analyze the gas for methane, carbon dioxide, and oxygen (as percent by volume). Although nitrogen is not read directly, it can be calculated in the following manner:

$$\text{Balance gas} = 100\% - (\%CH_4 + \%CO_2 + \%O_2)$$

The balance gas represents the nitrogen content of the gas, as the trace gases typically make up much less than 1 percent of the total gas collected.

In addition, pressure will be measured at existing groundwater monitoring wells, using a pressure gauge (a Magnehelic®, or equivalent) with the appropriate sensitivity range to obtain an accurate pressure reading, to determine if excess landfill gas is contributing to excess pressure.

Operational Procedures

The portable combustible gas meter and pressure gauges will be operated according to the manufacturers' instructions. A summary of the operational procedures that will be used for the portable combustible gas meter and pressure gauges (i.e., calibration and monitoring procedures) is provided below.

General Information

On each day that landfill gas monitoring is being performed, record the following general information:

- Date
- Weather conditions
- Barometric pressure and trend
- Temperature
- Ground condition (saturated, frozen, etc.)
- Names of personnel performing the monitoring

Meter Calibration

Prior to initiating gas monitoring, the portable combustible gas meter will be calibrated in an area where the ambient concentrations of gases of concern are not present. The oxygen sensor and methane sensor will be calibrated in accordance with the manufacturer's recommended procedures.

The pressure gauges are calibrated by the manufacturer and do not require field calibration. Prior to measuring pressures, the appropriate pressure gauge will be selected (i.e., the gauge with the appropriate sensitivity range to obtain an accurate pressure reading), and the pressure gauge will be set to zero, to the extent possible. If the pressure gauge cannot be set precisely to zero prior to monitoring, the initial reading will be noted and subtracted from the measured reading.

Landfill Gas Monitoring at Groundwater Monitoring Wells (Pressure and Composition)

Groundwater monitoring wells, which are included in the scope of the gas monitoring plan, will be retrofitted with a sampling port. The sampling port will include a labcock valve (or equivalent), which will be used to connect the portable combustible gas meter and the pressure gauge (or gauges, if appropriate) to the groundwater monitoring well.

The following procedures will be followed to monitor the gas composition and gauge pressure (if present) at groundwater monitoring wells:

Pressure

1. Attach the low-pressure port of the pressure gauge to the monitoring port using silicone tubing. Open the labcock valve, record the pressure, and then close the labcock valve. If the gauge indicates a negative reading, switch the tubing on the gauge to the high-pressure sampling port and repeat the previous steps.

Gas Composition

1. Attach the portable combustible gas meter to the monitoring port using silicone tubing. Engage the internal pump of the combustible gas meter, and open the labcock valve. When the readings stabilize, record the concentrations and close the labcock valve.
2. After each reading using the portable combustible gas meter, remove the tubing from the monitoring port and allow the methane and carbon dioxide readings to return to zero.

Landfill Gas Monitoring at Geoprobe® Boreholes (Composition)

The following procedures will be followed to measure the gas composition within Geoprobe® borings:

1. After reaching the desired vertical depth with the Geoprobe® rods, retract the rods approximately 1 foot to disengage the expendable drive point.
2. Push the Post-Run Tubing (PRT) adapter into the landfill gas sampling tubing. Insert the adapter end of the tubing down the inside of the probe rods until it hits the bottom on the expendable drive point holder.
3. Turn the tubing in a counterclockwise direction, and apply slight downward pressure to engage the adapter threads with the expendable drive point holder.
4. Connect the outer end of the tubing to a silicone tubing adapter (if needed) or directly to the portable combustible gas meter. Engage the internal pump of the combustible gas meter, and purge the tubing for a minimum of 1 minute prior to recording and/or measuring the landfill gas concentrations (methane, oxygen, and carbon dioxide). When the readings stabilize, record the concentrations.

Maintenance Procedures

The portable combustible gas meter and pressure gauges will be maintained according to the manufacturers' instructions. A replacement meter and/or gauges will be ready for overnight shipment, if needed.

Appendix B
Example Forms/Logs

TEST PIT LOG

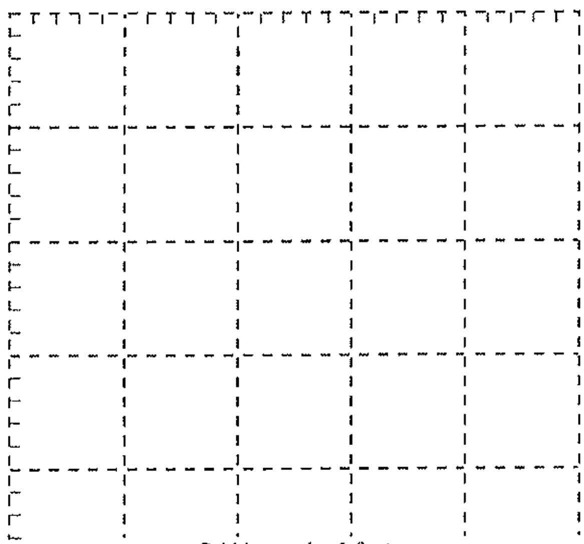
PROJECT: **PROJECT NO.:**

LOCATION: **CONTRACTOR:**

TEST PIT: **DATE:**

TIME BEGIN: **TIME END:**

TEST PIT DIAGRAM – PLAN VIEW



Grid interval = 1 foot

TEST PIT DIMENSIONS:

TEST PIT DEPTH (feet below land surface) FROM	TO	TEST PIT DESCRIPTION

RMT

Landfill Gas Monitoring
12th Street Landfill
Plainwell, Michigan

Sheet 1 of 2
Project No. ________
Prepared by: ________
Date ________

Monitoring Personnel: ____________________ **Temperature:** ______ °F

Barometric pressure: ______ in. Hg **Trend:** ____________________

Ground conditions: ____________________

Gas/O_2 meter model: ____________________ **Serial No:** ____________________

Date last calibrated: ____________________

Notes:

Gas Monitoring Data

LOCATION	PRESSURE (in. w.c.)	%CH_4	%O_2	%CO_2	% BAL.

RMT

Landfill Gas Monitoring
12th Street Landfill
Plainwell, Michigan

Project No. ______
Prepared by: ______
Date ______

LOCATION	PRESSURE (in. w.c.)	$\%CH_4$	$\%O_2$	$\%CO_2$	% BAL.

RMT INC

LOG OF TEST BORING

BORING NO.:	
SHEET of	
PROJECT:	PROJECT NO.:
LOCATION:	SURFACE ELEVATION:
DRILLED BY:	DATE STARTED: / DATE COMPLETED:
CREW CHIEF: / LOGGED BY:	CHECKED BY:

SAMPLING NOTES				ELEV. (ft.)	DEPTH (ft.)	VISUAL CLASSIFICATION AND GENERAL OBSERVATIONS
NO.	TYPE	RECOVERY				
		BLOWS	%			

NOTES	WATER LEVEL OBSERVATIONS			
DRILLING METHODS:	FIRST OCCURENCE:			
	DATE/TIME			
BOREHOLE DIAMETER:	DEPTH TO WATER			
DRILL RIG:	DEPTH TO CAVE IN			

F-203A (R 09-87)

87

RMT®

WATER LEVEL DATA FORM

Job Name: ____________________
Job Number: __________________ Date: ______________ Page ____ of ____

WELL ID	TIME	DEPTH TO WATER (feet below TOC)	TOTAL DEPTH (feet below TOC)	PURGE VOLUME (gallons)

RMT®

DATE ______
DWN ______
APP ______
REV ______

PROJECT NO.
00-05117.02

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
OU-4 Emergency Action at the 12th Street Landfill
Former Powerhouse Discharge Channel

WATER LEVEL DATA FORM

G:\DATA\HYDRO\DM\WATERLEVELTEMPLATE.XLS

FIELD SAMPLING FORM

Job Name: ____________________
Job Number: ____________________ Sample ID: ______________ Date: ___________

Media Sampled:	Soil _______	Groundwater _______	Sludge _______	Other _______
SAMPLE INFORMATION				
Container		Sample Collected By: ______________________________		
Type	Volume	Preservative	Comments	

Depth to Water (feet) = _______ Total Depth (feet) = _______ Purge Volume (gallons) = _______

FIELD PARAMETERS		Volume Purged (gallons): ______________________	
Parameter	Equipment	Results	Comments

General Comments (sample appearance, odor, etc):

Samples shipped to: ____

Via: FEDEX_______ Delivery_______ UPS_______ Other_______

Weather: ____

DATE_______
DWN_______
APP_______
REV_______
PROJECT NO.
00-05117.02

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
OU-4 Emergency Action at the 12th Street Landfill Former Powerhouse Discharge Channel

FIELD SAMPLING FORM

RMT®	LOCATION I.D.	
	JOB NO.	
	PROJECT	
	CLIENT	
	ELEVATION	
DRILLER:	STARTED	
INSPECTOR:	FINISHED	
	GROUNDWATER	

TYPE	SAMP	COR	CASE
DIA.			
WT			
FALL			

Well Construction	FT.	NO.	Type	Rec.	BLOWS per 6 in			CLASSIFICATION	REMARKS
	2								
	4								
	6								
	8								
	10								
	12								
	14								
	16								
	18								
	20								

RMT®

DATE________
DWN________
APP________
REV________
PROJECT NO.
00-05117.02

Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
OU-4 Emergency Action at the 12th Street Landfill Former Powerhouse Discharge Channel

TEST BORING RECORD

State of Wisconsin
Department of Natural Resources

CHAIN OF CUSTODY RECORD
Form 4100-145 7-87

Sample Collector(s)	Title/Work Station	Telephone No. (include area code)
Property Owner	Property Address	Telephone No. (include area code)

Split Samples: Offered? ☐ Yes ☐ No (Check One)
Accepted? ☐ Yes ☐ No (Check One) Accepted By: ____________________
Signature

Field ID No.	Date	Time	Sample Type		Station Location Sample Description	Lab ID Number	No. of Containers	Comments
			Comp	Grab				

I hereby certify that I received, properly handled, and disposed of these samples as noted below:

Relinquished By (Signature)	Date/Time	Received by: (Signature)
Relinquished By (Signature)	Date/Time	Received by: (Signature)
Relinquished By (Signature)	Date/Time	Received for Laboratory By: (Signature)

Disposition of Unused Portion of Sample:

Dispose __________ Retain for ________ days

Return __________ Other __________

Appendix C
Health and Safety Plan
for the Predesign Field Investigation

RMT

ENVIRONMENT • ENERGY • ENGINEERING

Appendix C
Health and Safety Plan

12th Street Landfill
Otsego Township, Michigan

Operable Unit No. 4 of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

February 2008

Prepared by RMT, Inc.
on behalf of Weyerhaeuser Company

RMT, Inc. | Weyerhaeuser Company
Final
I:\WPMSN\PJT\00-05117\02\R000511702-005.DOC

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Figure 1 Project Site Plan

Section 1
Introduction

This Health and Safety Plan (HSP) has been developed to protect field personnel and authorized site visitors during execution of the pre-design studies as stated in the Remedial Design Workplan by RMT at the 12th Street Landfill in Plainwell, Michigan. This HSP has been prepared in fulfillment of the requirements that are contained in the Consent Decree (CD) and the Statement of Work (SOW).

This HSP is intended to be used in conjunction with the Remedial Design Workplan and was prepared based on the use of current Occupational Safety and Health Administration (OSHA), and U.S. EPA federal regulations and published guidelines. The objective of the HSP is to ensure that safe working conditions exist at the site.

The HSP is organized into the following sections:

- Section 1: Introduction
- Section 2: Description of Operable Unit #4 (OU-4)
- Section 3: Predesign Studies
- Section 4: Risk Analysis
- Section 5: Site Health and Safety Plan
- Section 6: Visitor Safety
- Section 7: References

The Risk Analysis was performed to analyze the specific activities that will be performed at the site during the predesign studies and the chemical and physical hazards that may be encountered during the completion of the field activities. From the Risk Analysis, the HSP was developed. The HSP identifies the required training, personal protective equipment (PPE), monitoring equipment, and other work procedures (site controls, decontamination, etc.) to be utilized by on-site personnel.

This HSP is a dynamic document that will be updated as conditions change. The HSP is designed to protect RMT personnel. Subcontractors will be required to submit HSPs applicable to their prescribed activities.

Section 2
Description of Operable Unit #4

2.1 Site Setting and Features

The 12th Street Landfill is Operable Unit #4 (OU-4) of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Kalamazoo River Superfund Site) and is located in Otsego Township, in Allegan County, Michigan (Figure 1). The landfill is located immediately downstream of the former Plainwell Impoundment. This impoundment is the focus of an on-going Time Critical Removal Action (TCRA) which includes excavation of bank soils and sediment affected by polychlorinated biphenyls (PCBs) and the removal of the Plainwell Dam that created the former powerhouse channel located along the eastern boundary of the landfill.

The landfill is bordered to the east by the Kalamazoo River, to the south/southeast by woodlands that are owned by the State of Michigan (under the management of the Department of Natural Resources [MDNR]), to the southeast by the Plainwell Dam, to the southwest by a gravel mining operation, and to the north/northwest by wetlands (Figure 1). The industrial property south of the landfill may be part of the gravel mining operations. The entrance to the property on 12th Street, which is gated and locked, is located near the southwestern corner of the landfill. Fencing runs along the street frontage near the property's southern border. Access is further limited by gates that restrict entry to the MDNR property and the area being addressed under the TCRA.

The Record of Decision (ROD) describes the PCB-contaminated areas that comprise OU-4 as follows:

- The 12th Street Landfill from which PCB contamination in surrounding areas migrated, including any groundwater and landfill leachate, if any
- The woodland area located in the southeastern corner of OU-4
- Wetlands, as identified by the National Wetland Inventory Map (Figure 5 in the RD Workplan), adjacent to the landfill to the north and northwest
- A portion of the adjacent gravel operation property (adjacent property) that borders the landfill to the west
- A portion of the former powerhouse discharge channel of the Plainwell Dam on the Kalamazoo River, which contains residuals contiguous to the eastern side of the landfill

The landfill itself occupies an area of approximately 6½ acres. The landfill is situated on an approximately 24-acre property. Portions of OU-4, including the woodland area, the gravel operation adjacent to the landfill, and the former powerhouse discharge channel, are located outside the landfill property line (Figure 1). Contamination in the former powerhouse discharge channel was addressed as part of the Emergency Action in 2007 (refer to Subsection 3.3 in the Remedial Design Workplan).

For purposes of this document, the term "site" refers to OU-4 as it is defined in the ROD.

2.2 Site History

The following histories of the landfill and the Plainwell Dam prior to approximately 2005 are based on information presented in documents prepared by/for others (B&B, 1992; G&M, 1994a; G&M, 1994b; G&M, 1996; and Plainwell Paper, 1987).

2.2.1 12th Street Landfill

The 12th Street Landfill was in active operation from approximately 1955 to 1981. It was closed in 1984 by placing a soil cover over the fill and seeding the cover. Historical aerial photographs show that, prior to approximately 1955, the property on which the 12th Street Landfill is located was wetlands. During its operation, the landfill accepted paper residuals from the wastewater treatment plant at the former Plainwell Mill (mill), located in Plainwell, Michigan. The wastewater treatment plant initially consisted of a primary clarifier (built at the mill in 1954), which was later upgraded to include secondary treatment. Settled paper-making sludge (also referred to as residuals) from the clarifier was dewatered for several months in unlined lagoons at the mill, and was then hauled to, and disposed of, in the 12th Street Landfill. The landfill reportedly also accepted solid waste from the mill during part of its period of active operation. However, sanitary wastewater at the mill was discharged to the Plainwell publicly-owned treatment works (POTW).

In 1967, a full-scale secondary treatment system, consisting of an aerated lagoon and a clarifier, was built at the mill. Following construction of this treatment system, primary and secondary treatment system sludge, coal bottom ash, and coal fly ash were placed in the 12th Street Landfill until early 1981. In 1981, residuals remaining in some of the then-inactive lagoons at the mill were removed and placed in the landfill.

The paper residuals were disposed into a topographically low area of the 12th Street Landfill, which had received limited site preparation or engineering. The fill area was not lined and did not have a leachate collection system. Between 1955 and 1967, a retaining berm composed of sand, fly ash, and residuals was reportedly constructed around all but the southern side of the landfill. Subsequent field investigations showed that residuals are present outside the retaining berm in some areas. Historical aerial photographs show that disposal of paper residuals did not extend beyond 12th Street at the south end of the landfill property. The historical aerial photographs also show that 12th Street may have been "built up" relative to the adjacent land; potentially to access the Plainwell Dam during times of high water. The thickness of residuals within the landfill varies, with an estimated maximum thickness of approximately 25 feet.

At present, the landfill rises up to approximately 30 to 35 feet above the surrounding areas to the west, north, and east. The sideslopes of the landfill are steep, with slopes up to approximately 2H:1V, except along the river, where the regrading activities that were conducted in 2007 as part of the U.S. EPA-authorized Emergency Action reduced the slope to 5H:1V.

2.2.2 Plainwell Dam

The Plainwell Dam (dam) in the Kalamazoo River is located adjacent to the woodland area to the southeast of the 12th Street Landfill (Figure 1). The dam was constructed in 1902 as part of a hydroelectric facility. Around 1965, the dam was decommissioned from power generation, and ownership of the dam was transferred from Consumers Power Company to the Michigan Department of Natural Resources (MDNR). The MDNR raised and jammed the spillway control gates in the open position in order to lower the water level in the upstream impoundment (located south of the dam). In 1986, the MDNR removed the powerhouse structure, which had previously been located near the western end of the dam, and performed other modifications to the dam embankments and structure.

In February 2007, the U.S. EPA authorized the Kalamazoo River Study Group (KRSG) to conduct a Time-Critical Removal Action (TCRA) in the former Plainwell Impoundment (U.S. EPA, 2007a). The TCRA was designed to be completed in two phases: Phase I was completed in 2007, and Phase II is scheduled to be completed in 2008. Phase II of the TCRA includes removal of the Plainwell Dam. When the dam is removed, the former powerhouse channel will become the new main channel of the Kalamazoo River. This will significantly increase the velocity of the river in the former powerhouse channel, which is currently a backwater, and along the 12th Street Landfill. In light of the anticipated effects that removal of the Plainwell Dam could have on sediment in the former powerhouse channel and on the landfill slope that abuts the river, the U.S. EPA authorized Weyerhaeuser to implement certain Emergency Actions at OU-4 in 2007 (U.S. EPA, 2007b) to mitigate a potential release of paper residuals/sediment containing polychlorinated biphenyls (PCBs) to the environment (the river). These Emergency Actions resulted in a modification of the remedial action sequencing as described in the ROD, including the expedited design and construction of several components of the remedy in the area adjacent to the former powerhouse channel. A description of these Emergency Actions and their effect on the remaining scope of the Remedial Action for the OU-4 is provided in Subsection 3.3 of the Remedial Design (RD) Workplan.

2.3 Land Use

2.3.1 Current Land Use

Operable Unit #4 consists of the closed 12th Street Landfill and four areas outside the landfill where PCB-contaminated residual material has been observed. The entire landfill property includes the 6.5-acre closed landfill and the approximately 17 acres of wetland to the north/northwest of the landfill. There are no active operations or permanent buildings on the landfill property. After the eastern slope of the landfill (along the river) was regarded in 2007, temporary cover materials (6 inches of general fill, overlain by 6 inches of topsoil and a three-dimensional nylon turf reinforcement mat) were placed on this eastern slope of the landfill to provide protection from erosion due to surface water runoff until the final cover is installed as part of the Remedial Action. The new temporary cover in this area may need to be reseeded in the spring of 2008. A more complete description of the Emergency Action conducted at OU-4 in 2007 is provided in Subsection 3.3 of the RD Workplan.

The former powerhouse channel, which is located directly downstream of the dam, required excavation to remove visible paper residuals/sediment under the Emergency Action performed by Weyerhaeuser in 2007. In addition, permanent erosion protection (riprap) that was designed to withstand erosion forces from the re-routed river for a 500-year flood event, was installed along the landfill riverbank as part of the Emergency Action. A more complete description of the Emergency Action conducted at OU-4 in 2007 is provided in Subsection 3.3 of the RD Workplan.

The woodland area to the south/southeast of the landfill was significantly altered in 2007 by activities conducted by the KRSG as part of the TCRA in the former Plainwell Impoundment. Restoration of the portion of the woodland area affected by the TCRA is expected be completed by the KRSG in 2008. The spatial extent of paper residuals beyond the 12th Street Landfill property line onto the woodland area is estimated to be less than approximately 50 feet, based on previous investigation. These residuals will be addressed during the design and construction of the final 12th Street Landfill remedy.

There is an active gravel mining operation on the property southwest of the 12th Street Landfill. The extent of paper residuals beyond the landfill property line onto the gravel mining property is estimated to be up to 100 feet, based on previous investigations.

2.3.2 Potential Future Land Use

At present, no decisions have been made regarding the future use of the 12th Street Landfill property following implementation of the Remedial Action. One option being considered is the development of an education-based natural park area that can showcase the history of the Kalamazoo River in that area and highlight the wetland habitat. In concept, this educational eco-park may include walkways on the landfill cover with signs at designated viewing areas that would describe the history and the ecology of the area. Another potential future land use option being considered is to provide access to the township to extend a riverwalk along the landfill property that would connect the existing riverwalks in the cities of Plainwell and Otsego. Potential means for controlling access on the landfill property might include the use of boardwalks with floor and side rails, and/or dense vegetation. These potential future land use concepts will be further reviewed and developed during the remedial design process.

Section 3
Predesign Studies

Predesign studies are proposed to assist in the development of the remedial design for OU-4. The proposed predesign studies, along with the objectives and scope of the studies, are summarized in the subsections that follow. Additional details regarding the methods, procedures, equipment, and materials are contained in the Multi-Area Quality Assurance Project Plan (QAPP) (Appendix A in the RD Workplan) and the Multi-Area Field Sampling Plan (FSP) (Appendix B in the RD Workplan).

Decontamination of equipment utilized during the predesign studies will be performed at a designated location on the top of the landfill. Decontamination water will be discharged to the landfill surface at a rate that allows infiltration into the landfill without running off the landfill.

3.1 Data for Grading Design

Additional data are needed to better estimate the thickness of paper residuals along the property boundaries with 12th Street, the quarry to the southwest, and with the State property to the southeast, in order to reduce uncertainties in designing the final cover grades and to support discussions with the owners of these adjacent properties concerning access for purposes of implementing the remedial action. The scope of the investigative work necessary to obtain these data is as follows:

- Advance approximately 9 Geoprobe® borings into the 12th Street Landfill at select locations where fill material is believed to extend beyond the property landfill boundary to the southwest and to the southeast (Geoprobe® borings RDB-01 through RDB-09 on Figure 9 in the RD Workplan). The borings will be advanced approximately 5 feet into the native soil underlying the fill, or to refusal.
- Advance a minimum of two soil borings (RDB-10 and RDB-11) near the southern end of the landfill, as shown on Figure 9 in the RD Workplan, to confirm the thickness of the fill in this area. Advance the borings approximately 5 feet into the native soil underlying the fill or to refusal. The locations of these borings may be adjusted in the field as necessary to avoid underground or aboveground utility lines. Additional borings may be installed to the north of the initial borings as may be deemed useful by Weyerhaeuser, in consultation with the oversight agencies as needed, for purposes of designing the landfill cover (e.g., if fill material is not encountered at the location where existing data indicates fill is present).
- Prepare a Soil Boring Log (refer to the FSP in Appendix B in the RD Workplan for a sample log) for each borehole based on visible observation. Classify the materials encountered based on the procedures outlined in ASTM D-2488. The logs will document the borehole identification number, the drilling dates and times, the names of field personnel, soil descriptions, sample depths, and recovery. Retain a representative sample of each type of material encountered (no laboratory analyses are planned). As may be appropriate, photographs of the materials encountered or other pertinent observations will be documented. Photographs will be labeled to indicate the subject, location, date, name of photographer, and project identification number.

- The on-site geologist/engineer will prepare the Soil Boring Logs in the field. The logs will be reviewed by the senior engineer in the office. A field notebook will also be maintained by the on-site scientist to document other pertinent field information. The senior engineer will review the field notebook for clarity and completeness in meeting the investigation objectives.
- Abandon the boreholes by filling them with bentonite grout following completion of the borehole logs.
- Decontaminate the drilling equipment following completion of the work. Decontamination of equipment between borings is not necessary. Decontamination will be performed at a designated location on the top of the landfill.
- Dispose Geoprobe® samples on-site. Decontamination water will be discharged to the landfill surface at a rate that allows infiltration into the landfill without running of the landfill.
- Survey the locations and ground surface elevations of the boreholes following completion. The accuracy of the survey will be ± 0.01 foot for the horizontal coordinates and ± 0.1 foot for the vertical elevations. The survey locations will be added to the boring logs.

3.2 Landfill Gas Evaluation

Based on experience with other landfills containing similar materials, a passive gas venting system is likely to be necessary to prevent potential off-site gas migration from the landfill and to protect the integrity of the landfill cover. The detailed design of the passive gas venting system will be prepared during the design phase for the 12th Street Landfill and may include features that support the potential future development of an "eco-park." The passive gas venting system will also be designed such that it could be retrofitted to an active gas system if deemed necessary during the operations, monitoring, and maintenance (OM&M) period for the landfill.

To assist in the design for the passive gas venting system, the following scope of work will be performed:

- Review information that may be provided by the MDEQ in connection with the management of subsurface landfill gas at the King Highway Landfill (Operable Unit #3) for potential applicability to the 12th Street Landfill.
- Measure the concentrations of methane, carbon dioxide, and oxygen in the existing groundwater monitoring wells at the 12th Street Landfill that are screened in the vadose zone (MW-6A, MW-7A, and MW-8A), and in the Geoprobe® boreholes used to estimate the depth of the paper residuals along the property boundaries (refer to Figure 9 in the RD Workplan). Pressures that may have developed within the groundwater monitoring wells caused by excess landfill gas (if present) will also be measured.

A passive gas venting system can be designed without the above information. If these data cannot be readily obtained, additional efforts will not be employed to collect the information.

3.3 Extent and Depth of Residuals Outside the Landfill Footprint

Wetland area to the north of the landfill - The approximate areal extent of visible paper residuals beyond the toe of the landfill within the wetland has been defined through previous investigations

(G&M, 1994b and U.S. EPA, 2004). This delineation needs to be confirmed at limited locations, as part of the predesign studies. In addition, constructibility issues associated with a high water table in the wetland and the degree of difficulty in distinguishing the visible paper residuals from the native soil also need to be evaluated. The scope of the investigative work recommended to provide this information is as follows:

- Approximately three test pits (RDTP-01 through RDTP-03) will be excavated at the approximate locations in the wetland as shown on Figure 10 in the RD Workplan. The test pits are anticipated to be approximately 10 to 15 feet long (perpendicular to the edge of the landfill) and approximately 2 to 4 feet wide. The test pits will be excavated to a maximum depth of 3 feet if no paper residuals are apparent, or to the bottom of visually-identifiable residuals. The depth and lateral extent of residuals in each test pit will be documented in the field by preparing a Test Pit Log (refer to the FSP in the RD Workplan for a sample log).
- If necessary, additional test pits may be excavated either closer to, or farther from, the toe of the landfill in order to adequately meet the investigative objectives.
- Equipment used to excavate the test pits will be decontaminated following completion of the work. Decontamination of equipment between test pits is not necessary. Decontamination will be performed at a designated location on the top of the landfill.
- Decontamination water will be containerized in 55-gallon barrels that will be properly labeled and stored on-site.

In the event that in-field conditions limit the use of test pit excavating equipment (e.g., backhoe), other tools, such as hand augers or shovels, may be used instead. In such instances, Weyerhaeuser's representative will discuss the site conditions with a U.S. EPA representative, if one is available in the field, and will solicit additional ideas for collecting the targeted information. If a U.S. EPA representative is not available in the field, decisions will be made in the field by Weyerhaeuser to collect the targeted information. Weyerhaeuser will document such field modifications.

Quarry/State properties - Delineation of the areal extent and depth of visible paper residuals on the quarry property to the southwest and on the State property to the southeast is needed in order to support discussions with the owners of these adjacent properties concerning access for future remedial actions. The scope of the investigative work recommended to provide this information for the quarry/State properties is as follows:

- Approximately three test pits (RDTP-08 through RDTP-10) will be excavated on the quarry property, and approximately 4 test pits (RDTP-04 through RDTP-07) will be excavated on the State property, at the approximate locations shown on Figure 10 in the RD Workplan.
- The test pits are anticipated to be approximately 10 to 15 feet long (perpendicular to the edge of the landfill) and approximately 2 to 4 feet wide. The test pits will be excavated to a maximum depth of 3 feet if no paper residuals are apparent, or to the bottom of visually-identifiable residuals. The depth and lateral extent of residuals in each test pit will be documented in the field by preparing a Test Pit Log (refer to the FSP in the RD Workplan for a sample log).
- If necessary, additional test pits may be excavated to adequately meet the investigative objectives.

- Equipment used to excavate the test pits will be decontaminated following completion of the work. Decontamination of equipment between test pits is not necessary. Decontamination will be performed at a designated location on the top of the landfill.
- Decontamination water will be containerized in 55-gallon barrels that will be properly labeled and stored on-site.

In the event that in-field conditions limit the use of test pit excavating equipment, other tools, such as hand augers or shovels, may be used instead. In such instances, Weyerhaeuser's representative will discuss the site conditions with a U.S. EPA representative, if one is available in the field, and will solicit additional ideas for collecting the targeted information. If a U.S. EPA representative is not available in the field, decisions will be made in the field by Weyerhaeuser to collect the targeted information. Weyerhaeuser will document such field modifications.

3.4 Leachate Collection System Evaluation

The potential need for either an interim or a long-term leachate collection system within the fill materials as part of the remedial design will be evaluated during the predesign studies for the 12th Street Landfill. The evaluation will consider the presence of perched liquid within the waste; the water content of the waste; the potential for and the effects of settlement following placement of the final cover; the amount of water expected to be generated after placement of the final cover; and the practicability of extracting water from the fill materials.

The existing data (e.g., grain-size analysis, moisture content, and consolidation test results [BBL, 2001]), in conjunction with the industry's experience with landfills containing similar materials, are sufficient to evaluate the potential need for either an interim or a long-term leachate collection system within the fill materials. No additional field information is needed.

Results of the evaluations will be included in the Draft Design Report to facilitate the remedial design for the 12th Street Landfill.

Section 4
Risk Analysis

Risk Analysis (RA)

(Required for all RMT field projects.)

1. General Information

Business Unit: ☒ Environmental Consulting, Construction, or Remediation

☐ SmartBurn™

Client Name:	Weyerhaeuser Company	Project #:	5117.02	Task #:	
Project Name:	12th Street Landfill	Project Manager:	Linda Hicken		
Street Address:		City, State, ZIP	Plainwell, MI		
Prepared By:	Eric Watruba	Date:	February 20, 2008		
Approved By:	______ (PM)	Approved By:	______ (HSC)		
	Linda Hicken		John Hanson		
Date:	______	Date:	______		

Proposed Date(s) of Work: This work will be performed during the 2008 construction season.

Proposed Scope of Work On Site:

The purpose of this Risk Analysis and Site Health and Safety Plan is to assess potential risks, and to provide appropriate health and safety procedures, associated with the proposed predesign studies outlined in the Remedial Design Workplan and Section 3 of this Health and Safety Plan for the 12th Street Landfill. The Risk Analysis and Health and Safety Plan has been prepared in fulfillment of the requirements that are contained in the Consent Decree (CD) and the Statement of Work (SOW).

RMT Role(s) On Site:

☐ RMT Staff Will Not Be On Site (RA is for subcontractor information only)

☒ Resident Project Representative (*e.g.*, RPR, "Observe and Document")

☐ Construction Manager (*e.g.*, CM, Managing/General Contractor)

☐ Representative for Client (*e.g.*, "Agent for Owner")

☒ General On-site Consulting/Engineering Services

☒ Other

☐ Soil Sampling	☐ Solid Waste Sampling	☐ Liquid Waste Sampling
☐ Groundwater Sampling	☐ Surface Water Sampling	☐ Wastewater Sampling
☐ Sediment Sampling	☒ Surveying	☒ Geoprobe borings, excavation of test pits, landfill gas monitoring

Risk Analysis (RA)

(Required for all RMT field projects.)

Major Project Tasks	RMT Task	Subcontractor Task	Minimum PPE Level Required see HSP for details (suggested levels for Subcontractor work)
1. Advance approximately 11 Geoprobe borings	☐	☒	☐ N/A ☒ D ☐ C ☐ B ☐ A
2. Excavate test pits in the wetland, quarry, and State properties	☐	☒	☐ N/A ☒ D ☐ C ☐ B ☐ A
3. Measure landfill gas concentrations at existing groundwater monitoring wells and proposed Geoprobe borings	☒	☐	☐ N/A ☒ D ☐ C ☐ B ☐ A
4. Observe and document the Geoprobe borings and test pit excavations	☒	☐	☐ N/A ☒ D ☐ C ☐ B ☐ A
5. Survey the locations of the Geoprobe borings	☐	☒	☐ N/A ☒ D ☐ C ☐ B ☐ A

2. Contingency Planning

LOCAL EMERGENCY RESOURCES:	
Ambulance: 911	Emergency Room: 911
Police: 911	Fire Department: 911
USEPA Contact: ☐ N/A ☒ Michael Berkoff (312-353-8983)	Poison Control Center: 1-800-222-1222 ☐ Specify:
Other (client services offered, etc.):	

SITE RESOURCES:			
Drinking Water Supply	☒ RMT	☒ Subcontractor	☐ Client
Wash Water Supply	☒ RMT	☒ Subcontractor	☐ Client
Telephone – Land Line		☐ Subcontractor	☐ Client
Telephone - Cellular	☒ RMT	☒ Subcontractor	
First Aid Kit	☒ RMT	☒ Subcontractor	
Fire Extinguisher	☒ RMT	☒ Subcontractor	☐ Client
Emergency Shower	☐ RMT	☐ Subcontractor	☐ Client
Eye Wash	☐ RMT	☐ Subcontractor	☐ Client
Other:	☐ RMT	☐ Subcontractor	☐ Client

Risk Analysis (RA)

(Required for all RMT field projects.)

EMERGENCY CONTACTS:	
RMT Technical Contact:	Michael Amstadt 608/662-5271 (work) 608/358-2669 (cell)
RMT Project Manager (PM):	Linda Hicken 608/662-5307 608/358-1768
RMT Corporate Health & Safety Manager (CHSM): - Confined Space Permits - Air Monitoring Plans - Scaffolding Permits - Demolition Plan Approval	Jason Chevallard 864/234-9369 (work) 864/525-8357 (cell)
Radiation Safety Officer (RSO):	John Hanson 608/662-5238 (work) 608/220-2502 (cell - emergency only) 608/222-4588 (home - emergency only)
RMT Health & Safety Coordinator (HSC): – Excavation Permits – Hot Work Permits – Lockout/Tagout Permits – Traffic Control Plan Approval – Lighting Plan Approval	John Hanson 608/831-4444 (work) 608/222-4588 (home)
RMT Field Contact:	To be determined
Contractor Contact:	To be determined
Client Contact:	Jennifer Hale 253/924-3746 (work) 253/218-5147 (cell)

Emergency Route (provide detailed directions and/or attach a map):

The emergency route should be driven at least once before fieldwork begins, to verify that the planned route is feasible. Hospitals or clinics identified for emergency medical care should also be contacted, to verify that emergency care is provided at that location. Verify the exact location of the medical facility during this call.

Hospital: Borgess-Pipp Hospital

411 Naomi Street

Plainwell, MI 49080

269/685-0700

Other:

Directions to Plainwell, MI 49080-1222

YAHOO! LOCAL Maps

Summary and Notes

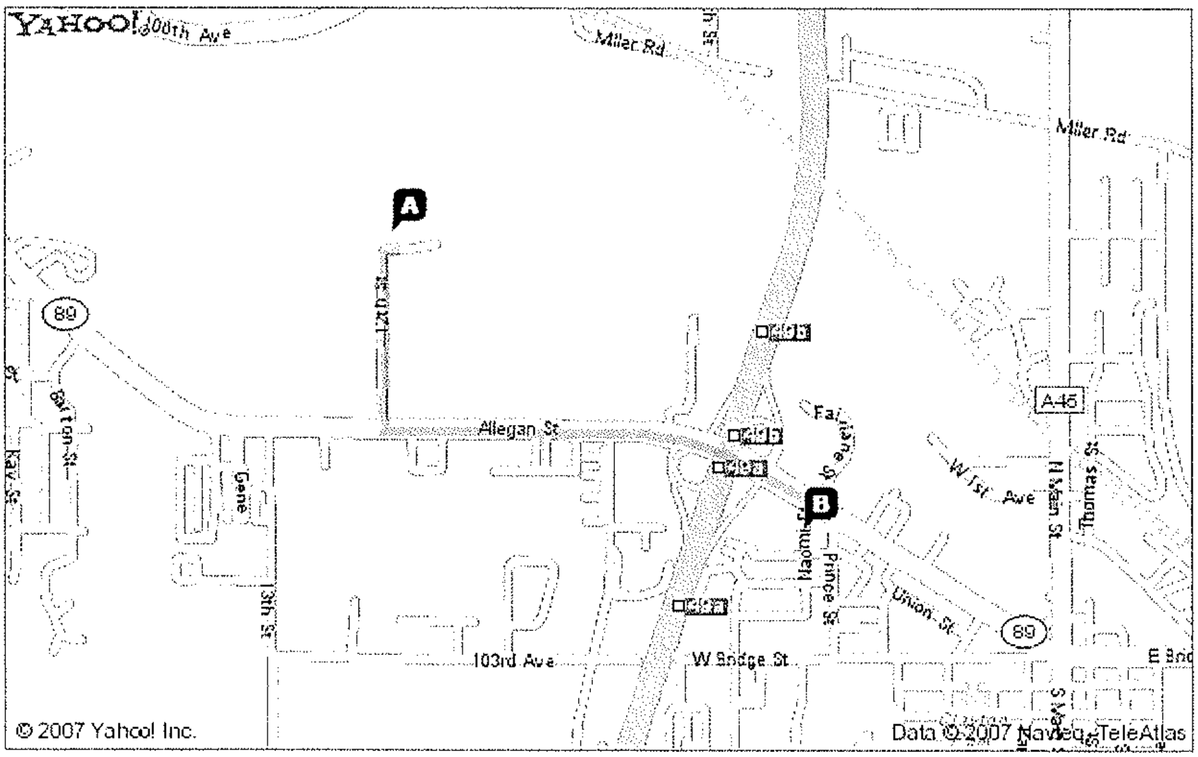
START	**42.456331,-85.670616,**
FINISH	**Borgess-Pipp Hospital (269) 685-0700 411 Naomi St, Plainwell, MI 49080-1222**

Total Distance: 1.5 miles, Total Time: 3 mins (approx.)

Add your notes here...

	Distance
A 42.456331,-85.670616,	
1. Starting at **42.456331,-85.670616** on **12TH ST**	go **0.4** mi
2. Turn **L** on **ALLEGAN ST[M-89]**	go **1.0** mi
3. Turn **R** on **NAOMI ST**	go **0.1** mi
4. Arrive at **411 NAOMI ST, PLAINWELL,** on the **R**	
B 411 NAOMI ST, PLAINWELL, MI 49080-1222	

Distance: 1.5miles, Time: 3 mins



When using any driving directions or map, it's a good idea to do a reality check and make sure the road still exists, watch out for construction, and follow all traffic safety precautions. This is only to be used as an aid in planning.

Risk Analysis (RA)

(Required for all RMT field projects.)

Emergency Procedures:

If an emergency develops at the site, the first responder should take the following course of action:

- Notify the proper emergency services for assistance.
- Notify other personnel at the site.
- As soon as possible, contact the RMT Incident Reporting Operator to inform them of the incident.
- Prepare a summary report of the incident for the client representative as required.

Emergency Equipment Required On Site:

☒ First Aid Kit

☐ Emergency Eye Wash

☐ Emergency Shower

☒ Fire Extinguisher

☐ Spill Control Media

☐ Other:

Investigation of Near Miss Incident and Initial Report of Incident/Exposure:

RMT employees are required to report any incident, near miss, or injury, as soon as possible, by contacting the following:

☒ RMT Incident Report Operator
(866) 902-4577

☒ Notify supervisor

☒ Notify project manager

☒ Notify client
(name): Jennifer Hale
(phone number) (253) 924-3746

☐ Complete client report:

The incident report submittal operator will obtain the necessary information from the employee and enter the information into the H&S incident database. All appropriate H&S, HR, and legal staff will be notified and will follow up as necessary.

Note: Pursuant to RMT's "Drug and Substance Abuse" policy (#45), RMT may require employees or subcontractors to be tested upon reasonable suspicion, following accidents or incidents during work activities, or during travel to or from a project site. Client policies may be more stringent in regard to procedures following an accident. Project managers must be aware of these and inform employees and subcontractors of any additional requirements.

Risk Analysis (RA)

(Required for all RMT field projects.)

3. Site Classification

	Identification of Potential Hazards	YES	NO	SITE TYPE[1]
1.	Is the work a Phase I ESA (i.e., supervised plant walk-through, etc.)	☐	☒	1
2.	Is the work being performed solely by a subcontractor (i.e., RMT not on site)	☐	☒	1
3.	Is the work just a supervised inspection for process evaluation, other inspections, meetings, records review, or a tour?	☐	☒	1
4.*	Is the work completely absent any chemical, physical, biological, or radiological hazards which would require a site specific health and safety plan?	☐	☒	1
5.	Does the work include any mandatory client H&S requirements?	☐	☒	1, 2, or 3
6.	Does the project include on-site work other than office type areas?	☒	☐	2 or 3
7.	Does the proposed work scope involve any of the following:			
	Known and controlled chemical or biological hazards	☒	☐	2
	Unprotected work at elevation (fall protection required)	☐	☒	2
	Invasive activities (*i.e.*, Phase II ESA, UST Removal, sampling, etc.)	☒	☐	2 or 3
	Exposure to ionizing radiation (i.e., using nuclear gauges, etc.)	☐	☒	2 or 3
	Open excavations/trenches (competent person may be required on site)	☒	☐	2 or 3
	Confined space entry (permit may be required)	☐	☒	2 or 3
	The use of scaffolding (qualified inspections are required)	☐	☒	2 or 3
	Heavy equipment	☒	☐	2 or 3
	Facility maintenance (O&M, piping, electrical, lockout/tagout, etc.)	☐	☒	2 or 3
	Underground utilities may be encountered	☒	☐	2 or 3
	Overhead utilities may be encountered	☒	☐	2 or 3
	Stack testing	☐	☒	2 or 3
	Geotechnical drilling	☒	☐	2 or 3
	Demolition Activities with known or suspected contamination	☐	☒	2 or 3
	Unknown or uncontrolled chemical or biological hazards	☐	☒	3
	Known and uncontrolled chemical or biological hazards	☒	☐	3
	Waste sampling	☐	☒	3
	Construction activities with known or suspected contamination	☒	☐	3
	Remedial activities (RCRA, CERCLA, EnviroBlend®, Oxigent, etc.)	☐	☒	3
8.	Is the work regulated by 29 CFR 1910.120 (OSHA) or 30 CFR (MSHA)?	☒	☐	3
9.	Is the work regulated by NPL, CERCLA, RCRA, TSD, or SARA?	☒	☐	3

(1) Denotes typical site level (based on activities).

Site Type Designation:

☐ **Type 1** Known and controlled hazards associated with consulting/engineering services

☐ **Type 2** Known and controlled hazards, but with invasive, hazardous activities and/or civil/mechanical construction related services, or sampling

☒ **Type 3** Unknown and/or uncontrolled hazards associated with corrective action clean-up, and/or remediation of hazardous substances

Risk Analysis (RA)

(Required for all RMT field projects.)

4. Site Characterization

Client Requirement(s)[1]:	☒ None	☐ Site Orientation	☐ H&S Orientation
	☐ Permits or Other Requirements (specify and attach, if available):		
Site Information:	☒ Map/Diagram (attach)	☐ Map/Diagram Unavailable	
	☒ Inactive Site	☐ Active Site (specify below)	
General Environmental Concerns:	☒ Contaminated Water	☐ Wastewater	☒ Dust
	☒ Contaminated Soil	☐ Solid Waste	☐ Noise
	☐ Contaminated Air	☐ Waterways	☐ Other:
Site Security/Access Control:	☐ None	☐ On Site	
	☒ Other (explain): Locked front gate		
Amenities Available for Work:	☒ None	☐ Waste Storage	☐ Restrooms
	☐ Tools/Equipment Storage	☐ Office/Trailer Space	☐ Supplies Storage
Utilities Available For Work:	☒ None	☐ As Listed:	
Medical Services Available:	☒ None On Site	☐ As Listed:	
Facility Alarms/Signals:	☒ None	☐ As Listed:	
Traffic/Parking/Railway Issues:	☒ None	☐ As Listed (On-Site/Off-Site):	
☐ Permits Required (specify)[2]:	☐ RMT:	☐ Local:	☐ State:
	☐ Federal:	☐ Other:	☒ N/A
☒ Utility Locate Service(s):	☐ On Site	☐ Client	☒ Other: Miss Dig
	☐ Off Site	☐ Diggers Hotline	☐ One Call
		☐ Julie, Inc.	☐ N/A

[1] If relying on the client for any specific hazard identification and control, implemented control and effectiveness should be documented prior to beginning any work activities. This is recommended for all field projects.

[2] Permit examples: Utilities (electrical, water, gas, etc.); Excavations; Explosives; Cranes; Burning; Fuel storage; Traffic control; Hoists; Cutting; Welding; Demolition; Confined space; Restricted access areas; etc.

Detailed Physical Description of Site/Facility: ☒ Map/Diagram Attached

Site Activities/Current Operations: ☒ None ☐ As Specified:

Other Concurrent Site Activities, Work, and/or Other Adjacent Hazards or Concerns:

☒ None

As Specified:

☐ Schools	☐ Daycare	☐ Hospital	☐ Airport
☐ Residential	☐ Offices	☐ Shopping	☐ Other

Risk Analysis (RA)

(Required for all RMT field projects.)

"TYPE 1" Site Acknowledgment Statement (if applicable):

As an employee of RMT, Inc., I have reviewed the Risk Analysis (RA). I hereby acknowledge that I have received the RA, and that I agree that the work area is a "**Type 1**" site that does not require a detailed Health & Safety Plan (HSP). If during work activities there are additional hazards identified, I will communicate those to the Project Manager (PM) and the Health & Safety Coordinator (HSC), and an updated RA will be prepared.

Signatures of RMT Site Personnel:

______________________________ Date: ______________

______________________________ Date: ______________

______________________________ Date: ______________

______________________________ Date: ______________

Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

4. Hazard Evaluation

Potential Chemical, Biological, or Radiological Hazards

Complete [1] Substance N/Ame (be specific)	Specific Applicable OSHA Standard (if any)	Physical State [2] (S, L, G, Aq, Vap, F, P)	Max. [3] Conc. Level Per Physical State	Potential Routes of Exposure [4] (Inh, Ing, Abs, Con, Ext)	Warning Properties (G, P, N)	General [5] Control Measures (Eng., Admin., PPE)	IP [6] (eV)	VP[6] (mm HG)	LEL[6] (%)	UEL[6] (%)	IDLH [7]	ACGIH TLV (C, ST,TWA) [8] (R) or (T) [9]	OSHA PEL (C, ST, TWA) [8] (R) or (T) [9]
4,4'-DDD		S	35.0	Inh., Ing., Abs., Con.	N	PPE	N/A	8e-005	N/A	N/A	25 mg/m3	0.25 mg/m3	0.25 mg/m3
4,4'-DDE		S	32.0	Inh., Ing., Abs., Con.	N	PPE	N/A	8e-005	N/A	N/A	25 mg/m3	0.25 mg/m3	0.25 mg/m3
4,4'-DDT		S	75.0	Inh., Ing., Abs., Con.	N	PPE	N/A	8e-005	N/A	N/A	25 mg/m3	0.25 mg/m3	0.25 mg/m3
2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD)		S	0.0000918	Inh., Ing., Abs., Con.	N	PPE	N/A	8e-005	N/A	N/A	25 mg/m3	0.25 mg/m3	0.25 mg/m3
Aldrin		S	4.4	Inh., Ing., Abs., Con.	N	PPE	N/A	8e-005	N/A	N/A	25 mg/m3	0.25 mg/m3	0.25 mg/m3
Arsenic (inorganic)	1910.1018	S	41.5	Inh., Ing., Abs., Con.	N	PPE	N/A	0	N/A	N/A	5 mg/m3	0.01 mg/m3	0.01 mg/m3
Chlordane		S	39.0	Inh., Ing., Abs., Con.	N	PPE	N/A	1e-005	N/A	N/A	100 mg/m3	0.5 mg/m3	0.5 mg/m3
Cyanide (salts)		S	18.1	Ing., Con.	N	PPE	varies	varies	N/A	N/A	varies	5 mg/m3	10
Dieldrin		S	17.0	Inh., Ing., Abs., Con.	N	PPE	N/A	8e-007	N/A	N/A	50 mg/m3	0.25 mg/m3	0.25 mg/m3
Heptachlor		S	16.0	Inh., Ing., Abs., Con.	N	PPE	N/A	0.0003	N/A	N/A	35 mg/m3	0.05 mg/m3	0.5 mg/m3
Lead	1910.1025	S	575	Inh., Ing., Con.	N	PPE	N/A	0	N/A	N/A	100 mg/m3	0.05 mg/m3	0.05 mg/m3

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Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

Potential Chemical, Biological, or Radiological Hazards

Complete [1] Substance N/Ame (be specific)	Specific Applicable OSHA Standard (if any)	Physical State [2] (S, L, G, Aq, Vap, F, P)	Max. [3] Conc. Level Per Physical State	Potential Routes of Exposure [4] (Inh, Ing, Abs, Con, Ext)	Warning Properties (G, P, N)	General [5] Control Measures (Eng., Admin., PPE)	IP [6] (eV)	VP[6] (mm HG)	LEL[6] (%)	UEL[6] (%)	IDLH [7]	ACGIH TLV (C, ST,TWA) [8] (R) or (T) [9]	OSHA PEL (C, ST, TWA) [8] (R) or (T) [9]
PCBs		S	74.0	Inh., Ing., Abs., Con.	N	PPE	N/A	0.00006-0.001	N/A	N/A	5 mg/m3	0.5-1 mg/m3	TWA 0.5-1.0 mg/m3 (skin)
Landfill gas (methane)							varies	varies	5.0	14.0	N/A	1000	N/A

(1) Use OSHA regulated name, not elemental forms. If available, attach MSDS. Identify any sample preservative or O&M chemicals or subcontractor chemicals in this table also.
(2) S = Solids, L = Liquid, G = Gas, Aq = Aqueous, Vap = Vapor, F = Fume, P = Airborne Particulate
(3) If available, attach laboratory results or summary tables.
(4) Inh = Inhalation Hazard, Ing = Ingestion Hazard, Abs = Absorption Hazard, Con = Contact Hazard, Ext = External Exposure Hazard
(5) See the following sections for detailed control measures: personal protection equipment (PPE), Air Monitoring (Admin), or Site Control (Admin and Eng.).
(6) IP = Ionization Potential, VP = Vapor Pressure, LEL = Lower Explosive Limit, UEL = Upper Explosive Limit, N/A = Not Applicable, N.D. = Not Determined
(7) IDLH = Immediately Dangerous to Life and Health. NEVER enter IDLH conditions on site without proper respiratory protection.
(8) C = Ceiling Value, ST = Short-Term Exposure Limit, TWA = Time-Weighted Average, None Est. = None Established
(9) R = Respirable Limit, T = Total Limit
(10) Warning Properties: Good (G), Poor (P), None (N)

Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

4. Hazard Evaluation (continued)

Site Specific Physical Hazards

HAZARD	SPECIFIC CONTROL MEASURE

Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☒	Drums	If drums are used on-site, they should be clearly labeled with the name of the contents. Drums should only be handled with the appropriate equipment. Drums discovered during excavations, etc., shall not be opened or moved until appropriate identification can be performed. At a minimum, Level B protection is required for sampling any unlabeled drums discovered during remediation procedures.
☒	Dust/Particulates (PNOR)(Particulates Not Otherwise Regulated) (OSHA PEL = 15 mg./m^3, total) (OSHA PEL = 5 mg./m^3, respirable)	For general dust, work should be performed up-wind if possible. If conditions warrant it, monitoring should be done with a PM-10. Monitoring should occur at least 3 times per day, and every time re-entering the site. Readings should be taken downwind from the work area or inside the equipment as indicated by the conditions on site. If the OSHA PEL is exceeded, or is likely to be exceeded, engineering or administrative controls should be used, or a dust respirator must be worn. For hazardous dusts, a detailed air monitoring plan and a respiratory protection plan should be developed for the site activities.
☒	Evening Work	If work is performed during the evening hours, work shall be limited by the availability and the quality of artificial lighting. Care should also be taken to avoid slip, trip, and fall hazards that are not as easy to identify during low light conditions.
☒	Excavations	Stay clear of excavation walls. RMT personnel will not enter an excavation, in accordance with 1926 Sub Part P. Subcontractor must provide a competent person on site, if one is required by the planned activities. Side cuts should conform to 1926 Subpart P requirements, or shoring should be used. All open excavations should be secured using traffic cones, barrier tape, or barricade signs stating "Do Not Enter Excavations", especially if left open overnight.
☒	Field Equipment	If field equipment is heavy or awkward to carry, get assistance or use carts to help move around the site.
☒	Field Vehicle	RMT personnel shall follow all applicable state and federal traffic laws while traveling to and from the site, and while working on the site. In particular the following laws should be followed: speed limits, parking restrictions, use of wipers and lights during precipitation events, limiting cell phone use, etc. It is the responsibility of the driver to verify that all safety equipment on the vehicle is working properly before they drive the vehicle. In particular the following items should be checked: tire pressure, tire tread, windshield wipers, windshield washer, headlights, tail lights, brake lights, spare tire, fire extinguisher, first aid kit, etc.
☒	Flooded Areas	Do not drive through flooded areas or standing water. Do not wade into moving water, or water deeper than 2 feet without adequate assistance.
☒	Flying Debris/ Eye Injuries	Be aware of any flying debris on site and wear protective eyewear when necessary.
☒	Hand Tools	Use only the appropriate tool for the task at hand. Use the tool(s) as designed, described, and intended by the manufacturer.
☒	Heat Stress	The work schedule may be modified if the ambient temperature is more than 80° F. Take breaks as necessary, and drink plenty of fluids. If necessary, wear sunscreen and sunglasses on bright days. Monitor site personnel for signs of heat stress symptoms (heat rash, heat cramps, heat exhaustion, or heat stroke).

Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☒	Heavy Equipment.	Contractor is responsible for safe operation of equipment. All mobile heavy equipment must have a functioning backup alarm, and operators must comply with equipment manufacturer's instructions. Maintain proper distance and remain in line of sight of operator and out of reach of equipment. Isolate equipment swings, if possible. Make eye contact with the equipment operator before approaching the equipment. Understand and review hand signals, and wear orange safety vest, if necessary.
☒	Heavy Lifting	Use proper lifting procedures and equipment when handling heavy objects such as drums, manhole covers, tank covers, etc.
☒	Housekeeping	All field vehicles, job trailers, and field offices will be properly cleaned and organized to prevent cluttered work and storage areas.
☒	Insects (ticks, bees, spiders, etc.)	Site workers with known allergies to insect bites should carry their own medication. In case of emergencies, inform fellow workers of any severe allergies. Use insect repellant as necessary, and as specifically allowed on site. If possible, wear long-sleeved shirts and pants. If appropriate, check for ticks at the end of each day. Have other appropriate first aid supplies handy for bites.
☒	Landfill Gas (Methane, CO2, Hydrogen Sulfide)	Avoid breathing gas, especially in low oxygen areas (simple asphyxiant). Potentially flammable and explosive, so keep ignition sources away from gas. Explosive conditions of LEL >5% in a work area should be ventilated as soon as possible, or the area should be evacuated.
☒	Leachate (Municipal Solid Waste - MSW)	MSW leachate may contain hazardous biological substances, so avoid physical contact with leachate and, if possible, stay up-wind. If contact is made with leachate, wash affected areas thoroughly with soap and water. If boots contact leachate they should be thoroughly washed with soap and water also.
☒	Lead	Wear gloves when in contact with lead contaminated soil, etc. Thoroughly wash hands and arms when daily work is completed.
☒	Long Hours/Fatigue	Long work hours can lead to fatigue, and fatigue can lead to the physical inability to perform the work in a safe manner, or travel to, or from, a work site in a safe manner. If long work hours are scheduled, or if the scheduled work takes longer than planned, field staff should determine if fatigue is, or will be, an issue. Field staff should evaluate whether they are able to complete the work in a safe manner, or whether they are able to travel in a safe manner. If fatigue is an issue, appropriate breaks should be planned or taken, including overnight stays when necessary.
☒	Material Handling	Move containers and heavy material only with the proper equipment, and secure them to prevent dropping, falling, or loss of control during transport. Stay clear of material handling operations, especially near slopes. Do not stand down the slope from equipment, supplies or materials being moved above on the slope, or being deployed onto the slope.
☒	Methane Gas (Landfill Gas)	Explosive conditions (5% LEL) will be ventilated, if encountered, prior to working in an area. Methane is a simple asphyxiant.
☒	Noise	Hearing protection must be worn when noise levels exceed 85 dBA in the work area. If you need to raise your voice to be heard at the work site, then hearing protection should be worn. Hearing protection will be worn near drill rigs.
☒	Poisonous Plants	Be able to identify any local poisonous plants and avoid them if possible, or wear protective clothing as necessary. When removing potentially exposed clothing or PPE, the clothing or PPE should be carefully and thoroughly washed or decontaminated.

Risk Analysis (RA)

(Required for all RMT Type 2 or Type 3 field projects.)

Other Common Physical Hazards

(modify as needed, but include with all project hazard assessments)

☒	PHYSICAL HAZARD	GENERAL CONTROL MEASURE
☒	Severe Weather	Work may be suspended if dangerous weather conditions (lightening, tornadoes, high winds, heavy rain, freezing rain, etc.) occur. Be aware of changing weather conditions, and be prepared to take shelter as necessary. Potential shelters should be identified prior to beginning work.
☒	Sharp Objects	Wear appropriate gloves when handling sharp objects, or use appropriate equipment to move objects.
☒	Slippery Ground/Surfaces	Exercise caution, especially on slopes, field trailer floors and stairs, after a precipitation event. Use slip resistant boots, or implement surface preparations to eliminate the slippery nature of the surface prior to accessing the area. Spill control measures and general housekeeping should be utilized to help prevent slipping on wet floors, wet pavement, and general work areas.
☒	Slips, Trips, and Falls:	Maintain clear walkways for work areas.
☒	Snakes	Be aware of the potential for snakes in the area and wear snake boots, snake chaps, gaiters, or leggings as needed.
☒	Steep Slopes or Banks	Pay attention to footing and walking. Stay a safe distance from unstable or extremely steep slopes. Wear appropriate footwear. Be aware of potential slope or bank failures. Heavy equipment should not be operated on or near unstable slopes or banks.
☒	Strong Nuisance Odors	Strong odors should be ventilated before entering a work area, or a respirator shall be worn as needed.
☒	Sunburn	For extended periods of time outdoors on sunny days, sunglasses, long-sleeved shirts and long pants should be worn to help prevent sunburn and eye problems. Wear sunscreen as appropriate for the project.
☒	Terrain	Uneven or steep terrain can cause hazardous conditions for walking and transporting equipment around the site. Site personnel should use caution when working on uneven surfaces, and they should avoid working down-slope from heavy equipment, or materials being moved or stored.
☒	Trip Hazards (wires, cords, hoses, debris, corn stubble, uneven surfaces, etc.)	Temporary wires, cords, hoses, etc., should be properly located, marked, and protected to help prevent tripping and disruption to work activities. Trip hazards are particularly a problem early in the morning, late in the day, or under other poor lighting conditions.
☒	Uneven Surfaces	Be aware of uneven walking or driving surfaces and exercise caution when moving around the site.
☒	Utilities – Underground (electric, gas, telephone, water, storm sewer, sanitary sewer, cable TV, etc.).	A subcontractor, the client, or RMT will call Miss Dig to locate all underground utilities. The owner or client will be responsible for marking all applicable on-site underground utilities, product lines, pipes, and tanks.

Section 5
Site Health and Safety Plan

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

1. General Information

Client Name:	Weyerhaeuser Company	Project #:	5117.02	Task #:
Project Name:	12th Street Landfill	Project Manager:	Linda Hicken	
Prepared By:	Eric Watruba	Date:	February 20, 2008	
Approved By:	Linda Hicken (PM)	Approved By:	John Hanson (HSC)	
Date:		Date:		

Proposed Date(s) of RMT Work: This work will be performed during the 2008 construction season.

ON-SITE PROJECT TEAM MEMBER	ON-SITE PROJECT RESPONSIBILITIES
To be determined	RMT Site Health and Safety Representative (Supervisor)
Michael Amstadt	Project Engineer
John Rice	Project Hydrogeologist
Eric Watruba	Project Technical Coordinator
To be determined	Project Scientist
To be determined	Observation and Documentation
N/A	Soil Sampling
N/A	Groundwater Sampling
To be determined	Surveying

(1) Field projects will be audited for H&S compliance if they meet the requirements of the audit program.

Any required construction/demolition activities: ☐ No ☒ Yes If Yes, complete Section 2

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

2. Construction Tasks: [work tasks to be performed by RMT staff or RMT subcontractors]

Civil

- ☐ Sewer (utility)
- ☐ Water (utility)
- ☐ Electric (utility)
- ☐ Communications (utility)
- ☐ Siding
- ☐ Roofing
- ☐ Drywall
- ☐ Flooring
- ☐ Ceilings
- ☐ Casework
- ☐ Masonry
- ☐ Escalator
- ☐ Steel (erection)
- ☐ Pre-cast (erection)
- ☐ Concrete (erection)
- ☐ Re-bar
- ☐ Elevator
- ☐ Fireproofing
- ☐ Windows
- ☐ Landscaping
- ☐ Painting
- ☐ Insulation
- ☐ Doors
- ☐ Finish Concrete

Mechanical

- ☐ Insulation
- ☐ Millwright
- ☐ Fire Protection
- ☐ Boiler
- ☐ Industrial Ventilation
- ☐ Steel Fabrication/Erection

Other

- ☐ Electrical
- ☐ Demolition (attach a detailed "**Demolition Plan**")

- ☒ Others Advance approximately 11 Geoprobe borings
- ☒ Others Excavate test pits in the wetland, quarry, and State properties
- ☒ Others Survey the locations of the Geoprobe borings

Estimated Direct-Hire RMT Employees:

Home Office: ☒ Not Applicable ☐ Specify:

Craft Labor: ☒ Not Applicable ☐ Specify:

Craft Quantity

Craft Quantity

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

3. Applicable Safety Standards or Regulations:

☒ Federal OSHA ☒ State OSHA ☐ Owner/Client

Specific Standards:	29 CFR 1910 (OSHA)	29 CFR 1926 (Other Regulations)
☒ Medical Services and First Aid	1910.151	1926.50
☒ Hazard Communication (HAZCOM)	1910.1200	1926.59
☐ Lead Exposure	1910.1025	1926.62
☒ HAZWOPER	1910.120	1926.65
☐ Personal Protective Equipment (PPE)	1910.132-138	1926.95-107
☐ Respiratory Protection	1910.134	1926.103
☐ Ventilation	1910.94	1926.57
☐ Noise Exposure	1910.95	1926.52
☐ Illumination	N/A	1926.56
☐ Fire Protection	1910.157	1926.24 and 150-155
☐ Sanitation	1910.141	1926.51
☐ Materials Handling (rigging, etc.)	1910.176	1926.250-251
☐ Welding/Cutting	1910.251-255	1926.350-354
☐ Lockout/Tagout	1910.147	1926.417
☐ Electrical (flexible cords, etc.)	1910.305	1926.400-449
☐ Scaffolding	1910.28-29	1926.450-454
☐ Fall Protection (elevated work)	1910.23-29, 1910.66-68	1926.104-107; 500-503
☐ Ladders/Stairways	1910.25-27	1926.1050 and 1060
☐ Cranes, Derricks, Hoists, Elevators, etc.	1910.179-181	1926.550-555
☐ Aerial Lifts	1910.66-68	1926.556
☒ Earth Moving Equipment	N/A	1926.602
☐ Powered Industrial Trucks (forklifts)	1910.178	1926.602
☒ Excavations and Trenching	N/A	1926.650-652
☐ Concrete and Masonry	N/A	1926.700-706
☐ Steel Erection	N/A	1926.750-761
☐ Demolition	N/A	1926.850-860
☐ Asbestos	1910.1001	1926.1101
☐ Confined Space Entry	1910.146	1926.21
☐ Commercial Diving	1910.401-441	1926.1071-1092

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

☐ Compressed Gases	1910.101-105	N/A
☐ Ionizing Radiation	1910.1096	1926.53
☐ Benzene	1910.1028	1926.1128
☐ Cadmium	1910.1027	1926.1127
☒ Tools - Hand and Power	N/A	1926.300-307
☐ Blasting and Using Explosives	N/A	1926.900-914

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

4. Training Required

(* required for all "Type 3" sites; but minimum recommended)

Check "A" if training required for everyone, and check "T" if training required for specific task.

A	T	SUBJECT	REFERENCE 29 CFR 1910	29 CFR 1926 or Other
☒	☐	HAZWOPER 40 hour*	1910.120	1926.65
☐	☒	3-Day HAZWOPER Supervised On-Site*	1910.120	1926.65
☒	☐	8-Hour HAZWOPER Refresher*	1910.120	1926.65
☐	☒	8-Hour Supervisor HAZWOPER*	1910.120	1926.65
☐	☒	First Aid, CPR*	1910.151	1926.23,.50
☐	☐	Respiratory Protection	1910.134	1926.103
☐	☐	Confined Space ☐ Permit attached	1910.146	1926.21
☐	☐	Mine Safety (MSHA)	N/A	30 CFR 48.8
☐	☐	Lockout/Tagout ☐ Permit attached	1910.147	1926.417
☐	☐	Bloodborne Pathogens	1910.1030	N/A
☐	☐	Noise Exposure	1910.95	1926.52
☐	☐	Competent Person	N/A	1926.32,.450,.650
☐	☐	Construction Health and Safety OSHA 10-Hour	N/A	1926.21
☐	☐	Demolition	N/A	1926.850
☐	☒	Excavations ☐ Permit attached	N/A	1926.650-652
☐	☐	Electrical Work	1910.332	1926.400-.449
☐	☐	Ladders/Stairways	N/A	1926.1050-1060
☐	☐	Scaffolding	1910.28	1926.450-454
☐	☐	Fall Protection	1910.23-29; 1910.66-68	1926.104,.501
☐	☐	Commercial Diving	1910.410	1926.1071-1092
☐	☐	Hot Work ☐ Permit attached	1910.251-255	1926.350
☐	☐	Lead Awareness	1910.1025	1926.62
☐	☐	Asbestos Awareness	1910.1001	1926.1101
☐	☐	Cadmium	1910.1027	1926.1127
☐	☐	Benzene	1910.1028	1926.1128
☐	☐	Ionizing Radiation	1910.1096	1926.53; 10 CFR 19.12
☐	☐	Troxler or NITON Gauge User	1910.1096	10 CFR 19.12
☐	☐	Radiation Safety Program	1910.1096	10 CFR 20.1101
☐	☐	Hazard Communication (HAZCOM)	1910.1200	1926.59
☐	☐	DOT Hazardous Materials Shipping	1910.1201	49 CFR 172.704

Client-specific training: ☒ Not Applicable ☐

Site-specific orientation: ☒ Not Applicable ☐

Competent person: ☐ Not Applicable ☒ Excavations

Direct-hire employee training/certification: ☒ Not Applicable ☐

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

5. Medical Surveillance

Surveillance Required: * required for all "Type 3" sites; baseline is minimum recommended
** Specify frequency below

	29 CFR 1910	29 CFR 1926 or Other
☒ HAZWOPER Physical - Baseline*	1910.120	1926.65
☒ HAZWOPER Physical – Annual	1910.120	1926.65
☒ HAZWOPER Physical - Biennial*	1910.120	1926.65
☐ OSHA Respiratory Protection Questionnaire	1910.134	1926.103
☐ Respiratory Certification Exam	1910.134	1926.103
☐ Arsenic (urine) **	1910.1018	N/A
☐ Asbestos **	1910.1001	1926.1101
☐ Cadmium (blood) **	1910.1027	1926.1127
☐ Lead/ZPP (blood) **	1910.1025	1926.62
☐ Mercury (blood) **	N/A	N/A
☐ PCB **	N/A	N/A
☐ Vinyl Chloride **	1910.1017	1926.117
☐ Hepatitis B Vaccine (series) **	1910.1030	N/A
☐ Tetanus/Diphtheria	N/A	Stay Current
☐ Stress Test	N/A	Only as requested
☐ Visual Acuity Test	N/A	Only as requested
☐ Hearing Test (Audiometry)	N/A	Only as requested
☐ Pulmonary Function	N/A	Only as requested

Client-specific drug testing[1]: ☒ Not Applicable ☐

Client-specific medical monitoring[1]: ☒ Not Applicable ☐

Site-specific medical monitoring: ☒ Not Applicable ☐

**Frequency of medical monitoring: ☒ Not Applicable ☐

[1] Client required drug testing or medical monitoring should be coordinated through the CHSM.

Note: RMT has a "Drug and Substance Abuse" policy (#45). RMT may require employees or subcontractors to be tested upon reasonable suspicion, following accidents or incidents during work activities, or during travel to or from a project site. Client policies may be more strict in regard to procedures following an accident. Project managers must be aware of these and inform employees and subcontractors of any additional requirements.

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

6. Personal Protective Equipment (PPE)

Based on evaluation of potential hazards, the following levels of personal protection have been designated for the applicable work tasks:

Specific RMT Job Task or Function	Minimum Level of Protection			
RMT Site Visitors—Must be escorted	☒ D			
Excavate test pits in the wetland, quarry, and State properties	☒ D	☐ C	☐ B	☐ A
Level D: Safety glasses (ANSI); Safety shoes (ANSI); Ear plugs/muffs; Hard hat (ANSI)				
Measure landfill gas concentrations at existing groundwater monitoring wells and proposed Geoprobe borings	☒ D	☐ C	☐ B	☐ A
Level D: Safety glasses (ANSI); Safety shoes (ANSI); Ear plugs/muffs; Hard hat (ANSI)				
Observe and document the Geoprobe borings and test pit excavations. Personnel will not enter into test pits. Test pits will be observed from an adjacent location.	☒ D	☐ C	☐ B	☐ A
Level D: Safety glasses (ANSI); Safety shoes (ANSI); Ear plugs/muffs; Hard hat (ANSI)				
Survey the locations of the Geoprobe borings	☒ D	☐ C	☐ B	☐ A
Level D: Safety glasses (ANSI); Safety shoes (ANSI); Ear plugs/muffs; Hard hat (ANSI)				

Criteria for changing protection levels are as follows:

	APPROVALS REQUIRED (1)		
EVACUATION(2) or PROTECTION LEVEL CHANGE(3) CRITERIA	HSR	HSC	CHSM
Site Evacuation Plan: ☒ Not Applicable ☐ Specify or Attach Plan:			
Change to Level D when: ☒ Not Applicable ☐	☒		
Change to Level C when: ☐ Not Applicable ☒ should the dust levels rise to 15 mg/m3 above the background reading taken prior to work commencing	☒	☐	☐
Change to Level B when: ☐ Not Applicable ☐ Specify	☐	☐	☐
Change to Level A when: ☐ Not Applicable ☐ Specify	☐	☐	☐

(1) HSR: Health & Safety Supervisor On Site
HSC: Health & Safety Coordinator
CHSM: Corporate Health & Safety Manager

(2) General Recommendations: Evacuate the area when LEL readings are >10% LEL in the atmosphere, or when PID readings are greater than the PEL in the breathing zone.

(3) General Recommendation: To Level C when PID readings are greater than the PEL in the breathing zone. To Level B or A only after detailed evaluation and planning.

Note: Changes to the level of protection shall be made only after the required approvals are obtained. All changes shall be recorded in the field log and reported to the Project Manager as soon as possible. RMT's H&S goal is to avoid using respiratory protection unless it is absolutely necessary or required. Administrative controls or engineering controls should always be considered as a means to reduce potential exposures, before PPE is required or considered.

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

7. Air Monitoring[1]

The following monitoring instruments shall be used on site to measure airborne contaminant concentrations in Either the breathing zone, or as part of the overall site **Air Monitoring Plan** (attach detailed plan):

MONITORING EQUIPMENT	LOCATION OF MONITORING	FREQUENCY OF MONITORING	ACTION LEVELS
☐ Combustible Gas Indicator	☐ N/A ☐ Monitoring Plan Attached ☐ Confined Space ☐ Specify	☐ Continuously when potential combustible gases or lack of oxygen are suspected. ☐ Specify	5-10% LEL: continue with caution > 10 % LEL: evacuate the area ☐ Specify
☐ O2 Monitor ☐ CO Monitor ☐ H_2S Monitor	☐ N/A ☐ Confined Space ☐ Specify	☐ Continuously when excess oxygen (>22.5%) or lack of oxygen (<19.5%) are suspected. ☐ Specify	< 19.5% Oxygen: evacuate the area; supplied air may be needed > 22.5% Oxygen: evacuate the area; potential fire hazard ☐ Specify
☐ Colorimetric Tubes Type: Type: Type:	☐ N/A ☐ Specify ☐ Sample Container ☐ Confined Space ☐ Specify	☐ Periodically during sampling for analytical purposes only ☐ Whenever noticeable odor is present ☐ Specify	☐ Specify
☐ PID Lamp Needed: ☐ 9.8 eV ☐ 10.6 eV ☐ 11.7 eV Calibration Gas: Isobutylene Correction Factor:	☐ N/A ☐ Sample Container ☐ Confined Space ☐ Specify	☐ Periodically during sampling for analytical purposes only ☐ Specify ☐ Specify ☐ Specify	☐ Specify
☐ FID	☐ N/A ☐ Specify	☐ Specify	☐ Specify

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

☒Mini-RAM	☐ N/A ☒ In or near the breathing zone of affected employees (operators, samplers, etc.)	☒ Take a baseline reading prior to work and then periodic (every 15 minutes) monitoring whenever significant or prolonged dust levels are observed.	☒ Should levels increase to 15 mg/m3 or more above background readings for greater than 5 minutes sustained, protection levels should be examined and administrative controls be applied prior to upgrading PPE. Once particulate levels fall to less than 15 mg/m3 for more than 15 minutes continuously, level changes (if utilized) may be downgraded upon approval from the site H&S representative.
☐Other:	☐ Specify	☐ Specify	☐ Specify
☐Laboratory Supported ☐Personal ☐Area ☐Perimeter	☐ N/A ☐ Specify	☐ Specify	☐ Specify

(1) Whenever air monitoring is required to be performed, a detailed **Air-Monitoring Plan** should be developed and attached to the HSP. The plan should include **Monitoring Locations, Frequency of Readings**, and any **Action Levels** being used to control the work site.

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

8. Site Controls and Work Zones (describe in detail)

Facility Alarms or Signals: ☒ Not Applicable ☐ Specify

Work Permits Required: ☒ Not Applicable ☐ Specify

Work Traffic Issues: ☒ Not Applicable ☐ Specify

Parking Issues: ☒ Not Applicable ☐ Specify

Railway Traffic Issues: ☒ Not Applicable ☐ Specify

Support Zone(s):

☒ RMT field vehicle ☐ Job Trailer On Site ☒ Other: **See attached map/sketch**

Contamination Reduction Zone(s):

☒ Field vehicle ☐ Facility restroom/utility room ☒ Other: **See attached map/sketch**

Exclusion Zone(s):

☒ Area immediately surrounding work area ☐ Other:

Site Entry Procedures:

☒ **Notify Site H&S Representative.**

☒ **Read H&S Plan and sign Acknowledgment Statement**

☐ Check in with the facility contact person ☐ Specify

☐ Check in with facility security guard. ☐ Specify

☒ **Wear proper personal protective equipment.**

☒ Attend facility orientation ☒ Review visitor safety checklist

☒ **Conduct daily safety meeting (document).**

☐ Other: ☐ Specify

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

Decontamination Procedures:

Personnel:

Site workers should plan and stage for wash water and soap at the site, prior to beginning the work. Site workers should wash hands and any exposed skin extremely well with soap and water, prior to leaving the contamination reduction zone, eating, drinking, driving, or leaving the site. Any soiled or contaminated clothing should be removed and handled appropriately, by either washing as soon as possible, or if necessary, disposing. Soiled or contaminated clothing should be carefully bagged prior to disposal or washing, to reduce potential exposure.

Equipment:

The equipment which are known or suspected to be contaminated with paper residuals or sediment will be decontaminated. Decontamination will require the use of water, steam, heated detergent solutions, or water-miscible solvents, whichever is most effective. The wastewater will be collected and placed in a 55-gallon barrel.

Disposal of Investigation-derived Material:

☒ Leave on site for disposal. ☐ Other:

Work Limitations (time of day, buddy system, etc.):

☐ Buddy system required for some tasks

☒ Work will be performed during daylight hours only

☐ Work will be performed using artificial light.

Describe or attach a lighting plan:

☒ No eating, drinking, or smoking in contamination reduction zone(s) or exclusion zone(s)

☒ When temperatures are either above 80°F or below 20°F, work schedules may be modified

☐ Other site-specific limitations:

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Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

Radiation Safety:

- ☒ Radiation information is not applicable to this project.
- ☐ Notify RSO.
- ☐ Wear dosimeter badge when handling gauge.
- ☐ Post applicable radiation signs.and documents.
- ☐ Post emergency numbers.
- ☐ Provide at least two lock systems for overnight storage.
- ☐ Maintain storage at least 15 feet from full-time workstations.
- ☐ Block, brace, and securely lock the gauge during "all" transportation.
- ☐ Limit "public" exposure to gauge while in use.
- ☐ Provide sketch of gauge storage to RSO.

Site Health & Safety Plan

(Required for all RMT Type 2 or Type 3 field projects.)

Acknowledgment Statement:

As an employee of RMT, Inc., I have reviewed the Hazard Assessment (HA)/Health & Safety Plan (HSP). I hereby acknowledge that I have received the **required level of training and medical surveillance**, that I am knowledgeable about the contents of this site-specific RA/HSP, and that I will use personal protective equipment (PPE) and follow procedures specified in the HSP.

Signatures of RMT Site Personnel:

____________________ Date: __________

____________________ Date: __________

____________________ Date: __________

____________________ Date: __________

____________________ Date: __________

____________________ Date: __________

____________________ Date: __________

____________________ Date: __________

____________________ Date: __________

____________________ Date: __________

____________________ Date: __________

____________________ Date: __________

Health and Safety Field Audit Documentation:

If this project has been selected as a field audit candidate, the auditor will review a copy of this RA/HSP and make comments, edits, additions, or deletions on the copy. The audit copy of this document will then be forwarded to the office HSC for review. After review, the HSC will then forward the copy to the Project Manager for review and filing.

____________________ (auditor) Date: __________

Daily Safety Meeting Sign-in

Daily Hazard Review Topic:

Drums

Dust/Particulates (PNOR)(Particulates Not Otherwise Regulated)
(OSHA PEL = 15 mg./m3, total)
(OSHA PEL = 5 mg./m3, respirable)

Evening Work

Excavations

Field Equipment

Field Vehicle

Flooded Areas

Flying Debris/ Eye Injuries

Hand Tools

Heat Stress

Heavy Equipment

Heavy Lifting

Housekeeping

Insects (ticks, bees, spiders, etc.)

Landfill Gas (Methane, CO2, Hydrogen Sulfide)

Leachate (Municipal Solid Waste - MSW)

Lead

Long Hours/Fatigue

Material Handling

Methane Gas (Landfill Gas)

Noise

Poisonous Plants

Severe Weather

Sharp Objects

Slippery Ground/Surfaces

Slips, Trips, and Falls:

Snakes

Steep Slopes or Banks

Strong Nuisance Odors

Sunburn

Daily Safety Meeting Sign-in

Terrain

Trip Hazards (wires, cords, hoses, debris, corn stubble, uneven surfaces, etc.)

Uneven Surfaces

Utilities – Underground (electric, gas, telephone, water, storm sewer, sanitary sewer, cable TV, etc.).

Acknowledgment Statement:

As an affected employee of RMT, Inc., I hereby acknowledge that I have reviewed the contents of this site-specific HSP and the **daily safety meeting topic**, and that I will use the applicable personal protective equipment (PPE) and follow the procedures specified in the HSP.

Signatures of all onsite RMT Personnel, including Direct-Hires (Required):

_______________________________ Date: ______________

_______________________________ Date: ______________

_______________________________ Date: ______________

_______________________________ Date: ______________

_______________________________ Date: ______________

_______________________________ Date: ______________

_______________________________ Date: ______________

_______________________________ Date: ______________

_______________________________ Date: ______________

_______________________________ Date: ______________

_______________________________ Date: ______________

This document addresses the following aspects of RMT's Trenching and Excavation Program:

- Scope and Application
- Appendices/References
- Definitions
- Requirements for the Competent Person in Subpart P
- Identification of Key Elements
- Standard Operating Procedures

Scope

The scope of this subsection shall apply to all RMT projects that require excavations and/or trenches to be made within the earth's surface. It shall be the responsibility of the site safety manager to verify that a competent person, who meets the requirements of this subsection is identified and present on site during operations covered by this subsection. 29 CFR 1926 Subpart P applies to all open excavations made in the earth's surface. Excavations are designed to include trenches.

Appendices/References

The guidelines and/or requirements of this section have been developed based on the requirements of Occupational Safety and Health Administration (OSHA) 29 CFR 1926 Subpart P "Excavations," which includes the following sections:

- 29 CFR 1926.650 – Scope, application and definitions
- 29 CFR 1926.651 – Specific requirements
- 29 CFR 1926.652 – Requirements for protective systems

Definitions

- **Benching** —Means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.
- **Cave-ins** — The separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entray, bury, or otherwise injure and immobilize a person.
- **Competent Person** — One who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

- **Cross Braces** — The horizontal members of a shoring system installed perpendicular to the sides of the excavation, the ends of which bear against either uprights or wales.
- **Excavation** — Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.
- **Sheeting** — The members of shoring system that retain the earth in position and in turn are supported by other members of the shoring system.
- **Shield** — A structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built. Shields used in trenches are usually referred to as "trench boxes" or "trench shields."
- **Shoring** — A structure such as a metal hydraulic, mechanical, or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.
- **Sloping** — A method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.
- **Trench** — A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet.
- **Uprights** — The vertical members of a trench shoring system placed in contact with the earth and usually positioned so that individual members do not contact each other. Uprights placed so that individual members are closely spaced, in contact with or interconnected to each other, are often called "sheeting."
- **Wales** — Horizontal members of a shoring system placed parallel to the excavation face whose sides bear against the vertical members of the shoring system or earth.

Requirements for the Competent Person in Subpart P

Prior to the commencement of trenching and excavation activities under the control and/or directions of RMT, the site safety representative shall verify that a competent person meets the **requirements** of, and has the **authority** to, achieve the requirements of this section.

1926.651(c)(1)(i)	Design structural ramps used solely by employees. Design structural ramps used by equipment if qualified in structural design.
1926.651(h)(2)	Monitor water removal equipment and operations.
1926.651(h)(3)	Inspect excavations subject to runoff from heavy rains.

1926.651(k)(1)	Inspect excavations, the adjacent areas, and protective systems daily; prior to start of work and as needed throughout the shift. Also, after every rainstorm or other hazard increasing occurrence.
1926.651(k)(2)	Remove exposed employees from hazards posed by evidence of a possible cave-in, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions.
1926.652(a)(1)(ii)	Examine excavations less than 5 feet deep for indication of a potential cave-in to determine if a protective system is necessary.
1926.652(d)(3)	Examine damaged material or equipment to evaluate its suitability for continued use. Remove the material or equipment from use if it cannot be determined that it is able to support the intended loads or is otherwise suitable for safe use.
Appendix A(c)(1)	Classify soils.
Appendix A(c)(2)	Conduct as least one visual and one manual analysis of each soil sample being classified.
Appendix A(c)(5)	Evaluate the changes in a soil deposit if the properties, factors, or conditions affecting its classification change in any way and re-classify the deposit as necessary to reflect the changed circumstances.
App B(c)(3)(iii)	Determine the degree to which the actual slope of the face of an excavation must be reduced below the maximum allowable slope when surcharge loads from stored material or equipment, operating equipment, or traffic is present.

Identification of Key Elements

There are four basic operations associated with earth moving projects:

Excavations

1. Excavations are a common element in construction work. Excavation hazards may be created during project work, or may be an existing hazard of a site.
2. OSHA defines excavations as "any man-made cavity or depression in the earth's surface, including its sides, walls, or faces, formed by earth removal and producing unsupported earth conditions by reasons of the excavation. If installed forms or similar structures reduce the depth-to-width relationship, an excavation may become a trench." (29 CFR 1926.650 and 29 CFR 1926.651)
3. Excavations present many potential physical hazards. For workers on the site, the obvious hazards are falling into the excavation, or being knocked or pushed by equipment or other workers.

- If sampling or other activities must occur within the excavation, the threat of caving-in or sinking into the excavation exists.
- Chemical hazards may also exist if vapors are released during excavation activities.
- Unknown or unexpected hazards may be encountered during excavations, such as striking an unknown tank or pit of chemical waste.

Various utilities (electrical, gas and liquids) pose a great potential, both underground and overhead. All activities must be monitored from this point of view.

Dusts may be released, creating a physical and possibly a chemical hazard to both workers and other persons in the area.

Trenching

1. Trenches pose a great safety hazard because they may be quite narrow and therefore more obscured than an excavation.
   - OSHA defines a trench as "a narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet."
2. Trenching may present a constant source of hazards on a site because trenches frequently have to be crossed many times.
   - The danger is similar to that of a crevasse on a mountain! Equipment or personnel may fall into a trench, or equipment that is driven may become stuck while crossing a trench.
   - Caving-in is also a hazard. Chemical vapors may also be released.

Shoring

1. A shore is "a supporting member that resists a compressive force imposed by a load."
2. While shoring is actually used as a safety mechanism to support the sides of an excavation, or to support a building or other structure, it actually creates a hazard as well. Shoring must be designed and continually evaluated by a qualified engineer.
   - Shoring may collapse, crushing, burying, or trapping workers.
   - Shoring also makes the use of space more limited, making the use of personal protective equipment (PPE), such as airlines, more cumbersome.
   - Shoring creates an overhead hazard, where workers may bump into beams.
   - The wood used in shoring may tear or puncture PPE.

Drilling Operations

1. Drilling operations involve boring and auguring into soil or other surfaces.
    - Various types of mechanical equipment may be used to provide the force of drilling. Drilling may be on a small scale, such as during the installation of monitoring wells, or a large scale project such as oil or gas well drilling.
2. Drilling operations present physical and mechanical hazards as well. The equipment used in drilling can cause injury if not operated properly.
    - Combustion engines are often used as a power source, and these also present hazards in terms of flammability, and as sources of vapors.
    - Typical injuries that could result include eye injuries, burns, scrapes, and cuts from mechanical equipment.
    - Chemical hazards could also be present in the water or soil resulting from drill cuttings.

Standard Operating Procedures

1. All excavations must be preceded by proper notification to the local authority, utility service, or similar service that will locate and mark the location of underground utilities.
    - ■ All underground objects that may be encountered must be planned for carefully. Utility companies must be notified of the dates and type of work to be done.
        - Overhead utilities must also be considered for digging operations.
        - All work should be supervised to verify that there is sufficient clearance between equipment lines and the equipment.
2. An excavation permit shall be completed and reviewed by the on-site competent person prior to trenching and excavation activities commencing on site. Each separate and unique excavation location shall have a trenching and excavation permit completed. See Form F158, "Trenching and Excavation Permit."
3. All excavation sites must be protected by a fence or other barriers. Excavation sites must have signs warning workers and passersby of the excavation area.
4. Any objects that might cause injury to workers, such as trees, boulders, etc., must be removed before work begins.
5. All trenches 4 feet or greater in depth shall be provided with access and egress so that no employees travel within the trench to a point where egress is greater than 25 feet.
6. The walls and faces of all excavations must be preserved by sloping of the sides or shoring systems, or some other means.
7. Excavations must be inspected daily and after every rainstorm or other hazard-increasing occurrences, and the protection system against cave-ins must be fortified if necessary.

8. Shoring or other supporting systems must be designed by and regularly inspected by a qualified person and must meet accepted engineering requirements.

9. All trenches 5 feet or greater in depth shall be excavated to a minimum slope of 1 ½ horizontal to 1 vertical unless the area is comprised of rock that allows for stable wall facing. Other acceptable protective systems are utilized as allowed within 29 CFR 1926.652, "Requirements for Protective Systems."

   - The angle of repose will be flattened when an excavation has water conditions, silty materials, loose boulders, and areas where erosion is a problem.

     – Excavated materials must be stockpiled at least 2 feet from the edge of the excavation or at a greater distance as required by the project management.

     – Dust should be kept to a minimum by using water, oil, calcium chloride, or other means.

       If oxygen deficiency or gaseous contaminants may be a factor, then the air must be monitored.

     – Rescue and emergency breathing equipment must be readily available, and if necessary, confined space entry procedures implemented.

10. All employees must use PPE for the protection of the head, eyes, respiratory system, hands, feet, and other parts of the body as necessary.

11. In trenches, banks more than 5 feet high shall be shored, sloped, or otherwise stabilized. Those that cannot be easily stabilized with sloping should be sheeted and shored.

RMT

Excavation Permit

Project Name: Remedial Design Workplan
12th Street Landfill

Permit No.:

Date: February 20, 2008

Location of Excavation: 12th Street Landfill, Plainwell, Michigan

On-site Competent Person for Operation: To be determined

Is the excavation a trench by definition? Yes ☐ No ☒

If Yes, answer all questions under Section 1 and Section 2. If No, answer all questions under Section 1 only.

Section 1 – Excavation Only

1.1 Have potential underground utilities been located? N/A ☐ Yes ☐ No ☒

1.2 Is there reasonable potential for atmospheric hazards? Yes ☐ No ☒

1.3 If Yes to above, list air monitoring methods that will be used to ascertain exposure level and required levels of PPE.

POTENTIAL HAZARD LEL	INSTRUMENT	REQUIRED PPE
Oxygen (O_2)		
Carbon monoxide (CO)		
Hydrogen Sulfride (H_2S)		
Volatile organic compound (VOC)		
Other		

Note: Air monitoring data shall be documented on the RMT Direct Reading Instrument Log (Attachment A)

1.4 Is the excavation easily visible to employees and equipment traffic? Yes ☐ No ☐

1.5 If No to above, has the excavation been barricaded? Yes ☐ No ☐

1.6 Have adjacent structures been stabilized, if excavation will effect structural integrity? N/A ☐ Yes ☐ No ☐

Section 2 – Trench Excavation

2.1 Will the trench exceed 4 feet? Yes ☐ No ☐

2.2 Will employees physically enter trench? Yes ☐ No ☐

If No—stop here, if Yes answer the remaining questions

2.3 Is access and egress provided every 25 feet Yes ☐ No ☐

2.4 Have material and spoil piles been located at least 3 feet away from trench walls? Yes ☐ No ☐

2.5 Will trench depth exceed 5 feet? Yes ☐ No ☐

2.6 If Yes to above, has the competent person classified soils? Yes ☐ No ☐

2.7 If Yes to above, soils = Solid Rock ☐ Type B ☐
Type A ☐ Type C ☐

Method used to determine soil type

2.8 Have soils been previously disturbed? Yes ☐ No ☐

2.9 Does trench have water accumulation present? Yes ☐ No ☐

2.10 If Yes to above, how will water be removed and controlled?

____

____

2.11 Will the trench depth reach 20 feet — Yes ☐ No ☐

2.12 If Yes to above, has a Registered Professional Engineer approved the procedure? — Yes ☐ No ☐

2.13 If Yes to above, name of Registered Professional Engineer

____

stamp➔

2.14 Which protective system will the trench adhere to?

Sloping ☐ Benching ☐ Shoring ☐ Shielding ☐

2.15 Which of the following selected and approved the above protective system?

Competent Person ☐ Qualified Person ☐

Registered Professional Engineer ☐ None ☐

2.16 If atmospheric hazard were documented in Section 1, Question No. 3, have methods, equipment, and employee training requirements been identified? — N/A ☐ Yes ☐ No ☐

2.17 If Yes to above, list:

____

____

____

____

Note: Approval of permit is contingent on daily inspections of excavation as required in 29 CFR 1926, Subpart P.

Signatures

Site Health and Safety Representative (HSR): ______________________________

On-site Competent Person (Excavations): ______________________________

RMT Project Manager: ______________________________

Note: All permits are to be maintained on file for the duration of the project. An excavation permit is required for each separate excavation location.

RMT

Health & Safety
Direct Reading Instrument Log

Operator: ______________________ Date: ____________

Active Operation: ______________________

____

Weather: ______________________

Instrument: ____________ Miniram: ____________ Other: ____________

TIME	LOCATION	DURATION	PID	RAM	CO	H_2S	HCN	LEL	02	COMMENTS

Operator: ______________________ SSO: ______________________

Section 6
Visitor Safety Checklist

Read this checklist and complete Visitor Safety Orientation (by HSR).

☐ Sign in at prior to site entrance, and review Onsite Health & Safety Plan, if desired.

☐ Note the location of Visitor and Support Zones.

- The "Support Zone" will contain limited operations activities and is a clean zone.
- The "Visitor Observation Area" is the primary observation point for investigation activities. Primary hazards include nearby operating equipment and machinery. This area will be designated by the RMT site Health and Safety Representative.
- The "Contaminant Reduction Zone" is marked with yellow and red tape and the primary hazard is contact with wastewater solids. Visitors are not allowed in this area.
- The "Exclusion Zone" is adjacent to the excavation work and the primary hazard is contact with wastewater solids. Visitors are not allowed into this area unless approved by HSR.

☐ Know what is occurring within your 10' Circle of Safety.

Important Notes

- Visitors are responsible for their personal health and safety while on the site.

Section 7
References

Blasland & Bouck (B&B). 1992. Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site, description of the current situation. Kalamazoo River Study Group. July 1992.

Blasland, Bouck & Lee, Inc. (BBL). 2001. Geotechnical sample analytical data, 12th Street Landfill Operable Unit. Transmittal letter with attachments. June 25, 2001.

Geraghty & Miller (G&M). 1994a. Test pit investigation, technical memorandum, 12th Street Landfill Operable Unit, Plainwell, Michigan, Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site. February 18, 1994.

Geraghty & Miller (G&M). 1994b. Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site remedial investigation, technical memorandum 8, 12th Street Landfill Operable Unit, Plainwell, Michigan. May 31, 1994.

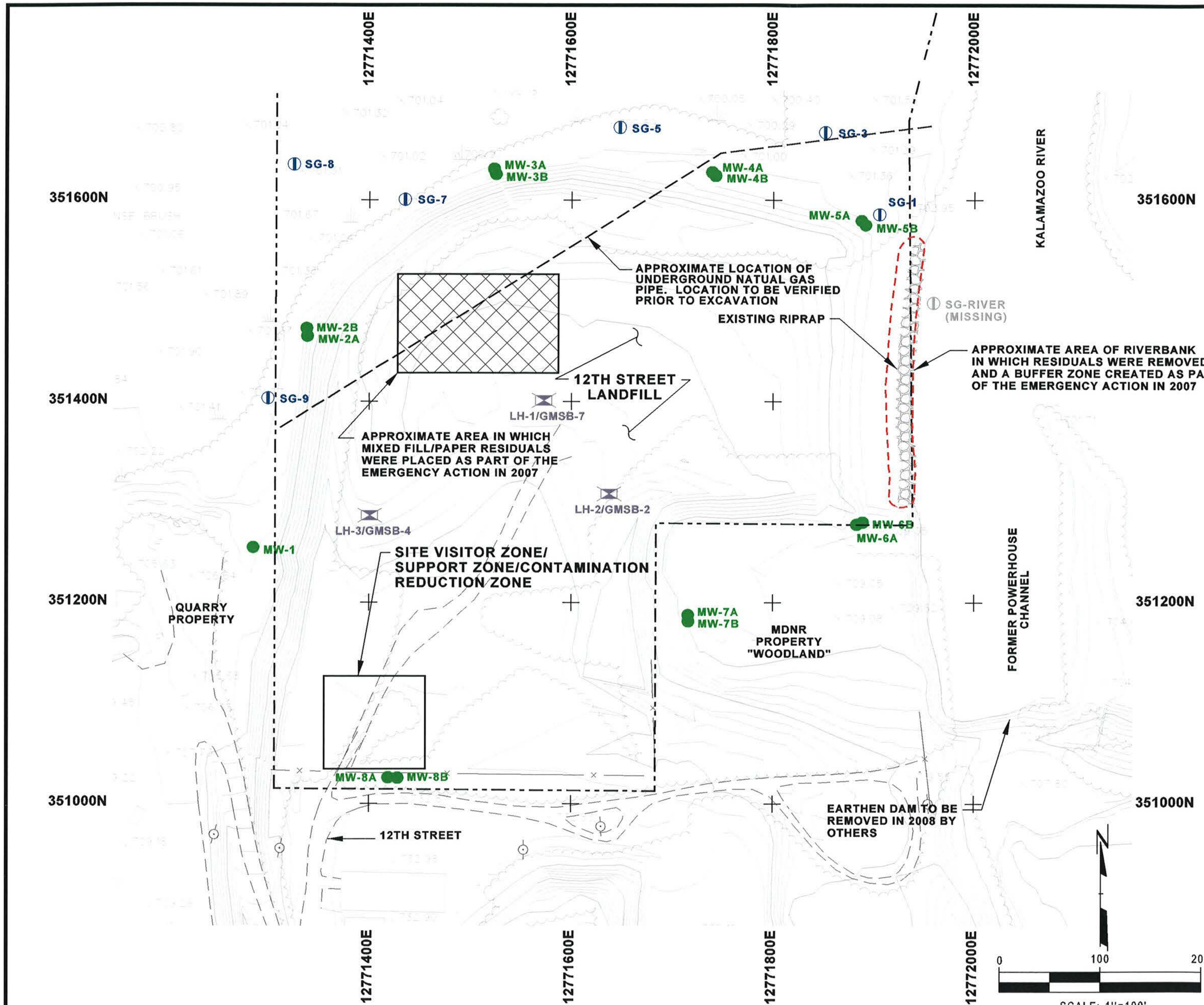
Geraghty & Miller (G&M). 1996. Remedial investigation report, 12th Street Landfill Operable Unit, Plainwell Michigan, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. December 20, 1996.

Plainwell Paper Co. 1987. Historical waste water disposal practices. Summary prepared by George Lawton of Plainwell Paper Company. EPA File No. 179031. June 3, 1987.

U.S. EPA. 2004. Final data summary report, soil/sediment sampling results, predesign sampling, 12th Street Landfill, Operable Unit #4, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. July 2004.

U.S. EPA. 2007a. Administrative settlement agreement and order on consent for removal action, Allied Paper/Portage Creek/Kalamazoo River Superfund site. Docket number V-W-07-C-863. February 21, 2007.

U.S. EPA. 2007b. Letter from the U.S. EPA authorizing Weyerhaeuser to conduct an emergency action at the 12th Street Landfill. August 1, 2007.



LEGEND

	APPROXIMATE PROPERTY BOUNDARY
	GRID LOCATION
	EXISTING UNPAVED ROAD
	EXISTING FENCE
	EXISTING BUILDING
	EXISTING 10' CONTOUR
	EXISTING 2' CONTOUR
	EXISTING SPOT ELEVATION
	EXISTING TREES AND/OR BRUSH
	EXISTING WETLAND
	EXISTING OVERHEAD ELECTRIC
MW-1	EXISTING MONITORING WELL
SG-3	EXISTING STAFF GAUGE
LH-1/GMSB-7	EXISTING LEACHATE HEADWELL

NOTES

1. BASE TOPOGRAPHY PROVIDED BY OAS, INC. OF SEYMOUR, INDIANA BASED ON AERIAL SURVEY DATED 3/30/2005. UPDATED TOPOGRAPHY FOR THE 12TH STREET LANDFILL WAS PROVIDED BY HOLLAND ENGINEERING, INC. SURVEY DATE: DECEMBER 6, 2007.
2. COORDINATES ARE MICHIGAN STATE PLANE-SOUTH ZONE. THE VERTICAL DATUM IS NGVD 29.
3. PROPERTY BOUNDARY BASED ON LEGAL DESCRIPTION PROVIDED BY U.S.EPA ON MARCH 30, 2004. COORDINATES FOR S 1/4 CORNER AND N 1/4 CORNER OF SECTION 24 AND NORTH BEARING USED TO PLOT PROPERTY LINE WERE PROVIDED BY HOLLAND ENGINEERING AND ARE BASED ON MICHIGAN STATE PLANE - SOUTH ZONE COORDINATES.

WORKING COPY

PROJECT:	12TH STREET LANDFILL HEALTH AND SAFETY PLAN OTSEGO TOWNSHIP, MICHIGAN		
SHEET TITLE:	PROJECT SITE PLAN		
DRAWN BY: stormerl	SCALE: 1"=100'	PROJ. NO.	5117.02 \ RDW
CHECKED BY: ECW		FILE NO.	H&S PLAN.PLT
APPROVED BY: LEH	DATE PRINTED:	FIGURE 1	
DATE: FEBRUARY 2008			

RMT FEB 2 0 2008

744 Heartland Trail
Madison, WI 53717-1934
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Phone: 608.831.4444
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Appendix D
Summary of Previous Investigations

Summary of Previous Investigations

NAME/DATE	OBJECTIVES	SAMPLING PERFORMED	RESULTS/CONCLUSIONS	COMMENTS
June and September 1987 and January 1989. MDNR and Mill Staff, 24 soil and residual samples outside berm. (Discussed in G&M, 1994a).	Evaluate extent of PCBs present outside retaining berm.	Twenty-four soil and residual samples	PCBs were reported at concentrations ranging from ▪ <0.1 mg/kg to 39 mg/kg for 23 of 24 samples (east, north and northwest), and ▪ 120 mg/kg in one sample (west).	▪ Data may be outdated. ▪ Locations of sample collection are uncertain. ▪ QA/QC procedures are uncertain.
(G&M, 1991). "12th Street Landfill Geophysical Investigation, Plainwell, Michigan." Letter Report by Geraghty and Miller, Inc. October 11, 1991.	Determine whether buried metal objects are present within landfill.	Electromagnetic conductivity survey and proton procession magnetometer survey, both on 20-foot grid	▪ Magnetic and electrical anomalies were detected. ▪ Buried metallic objects are likely present in the landfill, mainly in the southern and eastern portions.	
(G&M, 1994a). "Test Pit Investigation, Technical Memorandum, 12th Street Landfill Operable Unit, Plainwell, Michigan, Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site." Geraghty and Miller, Inc. February 18, 1994.	▪ Evaluate sources of geophysical anomalies. ▪ Characterize nature of paper residuals. ▪ Determine vertical and horizontal extent of regulated constituents in landfill. ▪ Provide data for risk assessments.	▪ Eleven test pits and 5 trenches excavated within the landfill ▪ Thirty-one samples analyzed for TCL/TAL (VOCs, semivolatiles, pesticides and PCBs, inorganics) ▪ Three samples analyzed for polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) ▪ Magnetic survey conducted ▪ Preliminary screening procedure done to identify chemicals of interest for further assessment	▪ Paper residuals are of two general types: light gray and dark gray; light-gray on top, and dark-gray deeper. ▪ Bailing wire and construction debris were found in quantities sufficient to cause geophysical anomalies. ▪ Empty drums of various types were found in several test pits. One drum was found to contain ignitable hazardous waste. ▪ The retaining berm consists of fly ash overlain by sand. Residuals are covered by 1-5 feet of cover. ▪ Leachate is perched above the residuals and is retained in construction debris, soil cover, and the retaining berm. ▪ Acetone, 2-butanone, and BTEX were the most frequently detected VOCs. VOCs generally were found at lower concentrations in samples from deeper locations (dark-gray residuals less VOCs than light-gray residuals). The highest VOC concentration was detected is toluene (29.0 mg/kg, D lab qualifier). ▪ SVOCs were detected infrequently. ▪ Pesticides 4,4'-DDE and 4,4'-DDT, were detected in half of the samples. The greatest diversity and greatest concentration of pesticides are located in the southcentral area of landfill. ▪ PCBs were detected in concentrations ranging from 0.027 mg/kg (J, P lab qualifiers) to 74 mg/kg (C lab qualifier). Aroclor-1254 was most frequently detected (17 of 29 samples analyzed). Generally, higher concentrations were from dark-gray residuals. ▪ Generally low concentrations of inorganics were detected. ▪ Dioxins and furans were found in each of three residual samples analyzed. ▪ Preliminary screening suggests the following ranking of chemicals for decreasing significance for site worker exposure: PCBs, pesticides, PCDDs/PCDFs, inorganics, SVOCs, and VOCs.	Data were gathered from inside landfill footprint only.

Summary of Previous Investigations (continued)

NAME/DATE	OBJECTIVES	SAMPLING PERFORMED	RESULTS/CONCLUSIONS	COMMENTS
(G&M, 1994b). "Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Remedial Investigation/Feasibility Study, Technical Memorandum 8, 12th Street Landfill Operable Unit, Plainwell, Michigan." Geraghty and Miller, Inc. May 31, 1994.	▪ Characterize chemical nature of wastes. ▪ Define any identifiable contaminant sources. ▪ Determine vertical and horizontal extent of contamination originating from site. ▪ Spatially quantify contamination to enable preparation of an Endangerment Assessment and an FS. ▪ Identify contaminant migration pathways and movement. ▪ Define distribution of PCBs, and chemically characterize residuals. ▪ Determine hydraulic conductivity of aquifer. ▪ Assess potential groundwater impacts along the periphery of the landfill. ▪ Assess the potential for leachate to transport chemicals from the landfill. ▪ Identify local groundwater flow systems, and evaluate the degree of hydraulic connection between the river and the groundwater system. ▪ Prepare a focused feasibility study.	▪ Fourteen hand-augered "delineation" borings (DB-1 through DB-14) around the outside of the perimeter of landfill – Residuals samples reportedly collected at base of residuals and analyzed for PCBs – Soil below residuals reportedly analyzed for TCL/TAL ▪ Fifteen soil borings (MW-2A/MW-2B through MW-8A/MW-8B and MW-1) along the circumference of landfill; eight sampled – Eight borings converted to monitoring wells, seven converted to piezometers; "A" wells shallow. Water level measurements taken on August 31, September 3, September 12, September 28, and December 15, 1993 – GW and leachate analyzed for TCL, TAL, COD, TSS, TOC, nitrate, chloride, sulfate, alkalinity, and PCBs ▪ Seven soil borings (GMSB-1 through GMSB-7) advanced within landfill, six of which go through to underlying materials – Samples at interface of residuals and underlying soil analyzed for TCL/TAL – Three converted to leachate head wells ▪ Hydraulic conductivity tests at 10 monitoring well locations ▪ Two river gauges installed ▪ Desktop and field wetlands assessment	▪ The soil/sand/fly ash cover on the landfill ranges from 2 and 7 feet thick. This is in contrast to the 1- to 7-foot–thick cover, as stated in the RI (G&M, 1996b). ▪ The residuals within the landfill are approximately 25 feet thick at the thickest location (near GMSB-4 and GMSB-7). ▪ Residuals extend laterally 60 feet beyond the berm on the northern and western sides of the landfill. ▪ Perched leachate is present within the residuals. ▪ The upper portion of the aquifer consists of sand and gravel. Shallow groundwater is in direct hydraulic connection with the river. The Plainwell dam has a major influence on groundwater flow. ▪ The distribution of PCBs within the residuals shows lower concentrations from 2 to 18 feet deep (7.2 mg/kg average) and higher concentrations from 18-28 feet deep (42.4 mg/kg average). Concentrations of PCBs ranged from below the detection limit to 158 mg/kg in the residuals. ▪ SVOCs (including benzo(a)anthracene, benzo(b)flouranthene, benzo(k)flouranthene, benzo(a)pyrene, and chrysene) were found in only one surface sample. However, no SVOCs were detected in the sample of residuals collected immediately above this sample. ▪ Subsurface soil generally contained PCBs at concentrations one to two orders of magnitude lower than the residuals immediately above them. ▪ Benzene, 2-methylnaphthalene and alpha-chlordane were detected in one subsurface soil sample, but not in groundwater or leachate samples, suggesting that significant leaching of these chemicals is not occurring. ▪ PCBs were not detected in any groundwater or leachate samples, suggesting that PCBs are not migrating with leachate in the landfill or with groundwater, either in a dissolved state or by colloidal transport. ▪ One SVOC, bis(2-ethylhexyl)phthalate, was found in groundwater samples from MW-3A.	▪ "Delineation" series of borings (DB-1 through DB-14) were not logged. The depth to the base of the residuals is unclear. ▪ Depth of PCB samples from some of the DB- borings was not recorded. ▪ Monitoring wells were reportedly installed inside the landfill toe, with the exception of MW-6A, MW-6B, MW-7A, MW-7B, MW-8A, and MW-8B. ▪ Text indicates that ponded water and inundation of land surface were observed in wetlands; however, field wetland characterization tables in Appendix F of the same report note that soil was saturated to the surface but not ponded water. ▪ Peat deposits underlie portions of the landfill.
(G&M, 1996a). "Remedial Investigation Addendum I, 12th Street Landfill Operable Unit, Plainwell, Michigan, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site." March 26, 1996.	Describe the results of an additional groundwater sampling event in August 1995. ▪ Monitor the elevation of water in and around the landfill and in the Kalamazoo River, and assess the direction of groundwater flow. ▪ Define the distribution of PCBs in groundwater.	▪ River stage and groundwater elevations monitored ▪ Groundwater and leachate samples analyzed for PCBs	▪ Surface water in the river flows from the upstream side of the dam into the groundwater system of the surficial aquifer, and then flows beneath the landfill, and then back into the river on the downstream side of the dam. ▪ PCBs were not detected in unfiltered samples of groundwater. Aroclor-1242 was detected in one of three unfiltered leachate samples at a concentration of 0.0014 mg/L.	

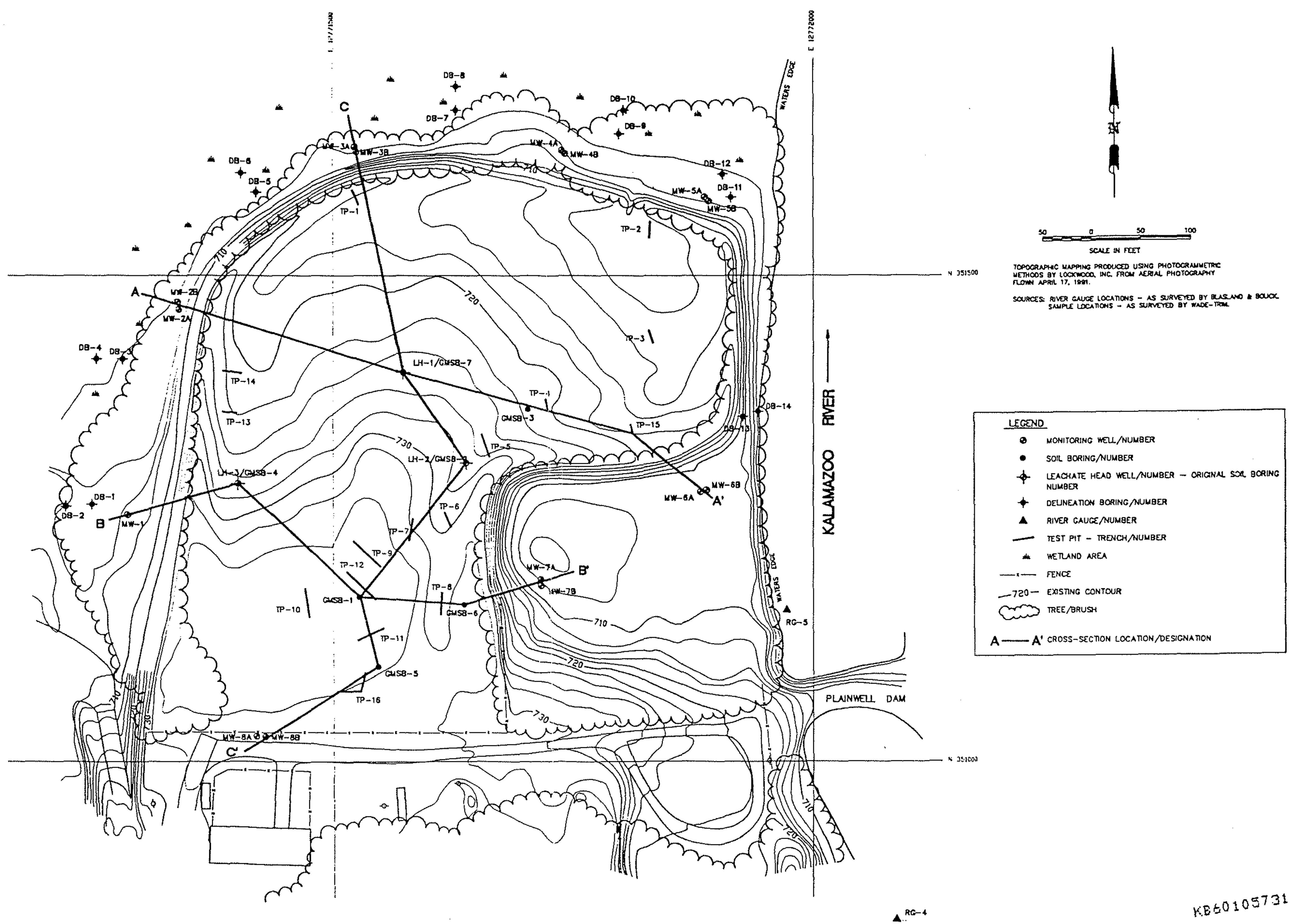
Summary of Previous Investigations (continued)

NAME/DATE	OBJECTIVES	SAMPLING PERFORMED	RESULTS/CONCLUSIONS	COMMENTS
(G&M, 1996b). "Remedial Investigation Report, 12th Street Landfill Operable Unit, Plainwell Michigan, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site." Geraghty and Miller, Inc. December 20, 1996.	▪ Summarize previous investigations. ▪ Present sampling methods and results of residual samples collected from the Kalamazoo River. ▪ Discuss the nature and extent of contamination at the landfill. ▪ Evaluate the fate and transport processes for the identified chemicals of potential concern.	Two grab samples of residuals were collected from the Kalamazoo River bed from locations adjacent to the landfill analyzed for PCBs	▪ Slug test data indicate a hydraulic conductivity of 1.2×10^{-1} cm/s to 5.3×10^{-3} cm/s in the surficial aquifer. ▪ Total PCB concentrations for the two samples of residuals collected from the riverbed 5 feet east of the landfill berm were 17 mg/kg and 29 mg/kg. ▪ Soil samples collected from beneath the landfill tended to contain PCBs at concentrations one to two orders of magnitude lower than the residuals immediately above them. Concentrations of PCBs in the subsurface soil ranged from below the detection limits to 52 mg/kg, with a mean of 4.9 mg/kg. ▪ PCBs are strongly bound to the paper residuals; migration of PCBs via groundwater is low. ▪ Surface water transport and erosion of exposed residuals on the landfill berm is the most likely future migration pathway for PBC contamination from the landfill.	Very little new data. Summarizes existing data.
(U.S. EPA, 2004). Former Discharge Channel Investigation.	▪ Delineate the extent of PCB-containing residuals to be excavated from the former powerhouse discharge channel adjacent to the landfill. ▪ Identify materials within reach of excavation equipment.	▪ Sampling grid of 20 feet perpendicular to channel and 50 feet parallel to channel, extending 60 feet into channel from west bank, and 250-300 feet along the east side of landfill ▪ Samples collected from a maximum depth of 1 foot ▪ Sample cores visibly contaminated with paper residuals not analyzed, it was assumed that those residuals would exceed cleanup criteria ▪ Twenty-eight samples analyzed for PCBs only	▪ Total PCB concentrations ranged from nondetect to 34 mg/kg. ▪ Highest concentration of 34 ppm was located at a depth interval of 0.5-0.7 feet, approximately 60 feet from bank near northeastern corner of landfill.	Results poorly documented. Results are summarized in Appendix 3 of U.S. EPA, 2004. Documentation of results is incomplete.
(BBL, 2001). "Geotechnical Sample Analytical Data, 12th Street Landfill Operable Unit." Transmittal Letter with Attachments. Blasland, Bouck & Lee, Inc. June 25, 2001.	▪ Evaluate material properties in the berms and paper residuals.	Ten soil borings (3 within retaining berms, 5 within residuals, 2 at edge of residuals) tested for: ▪ Moisture content (21) ▪ Specific gravity (11) ▪ Organic content (6) ▪ Bulk density (6) ▪ Grain size (12) ▪ Atterberg limits (6) ▪ Consolidation (4) ▪ UU Triaxial (4) ▪ Vane shear (8)	[Conclusions by RMT. Report contains only data.] ▪ Residuals typically have soft consistency. Berm materials (sand, fly ash and residuals) typically have loose density. ▪ Vane shear test results indicate that residuals have sensitivity ranging from 3 to 6 (strength loss from undisturbed to remolded condition).	

Summary of Previous Investigations (continued)

NAME/DATE	OBJECTIVES	SAMPLING PERFORMED	RESULTS/CONCLUSIONS	COMMENTS
(CDM, 2002). "Michigan Department of Environmental Quality, Kalamazoo River and Portage Creek Wetland Delineation Study," Camp Dresser and McKee. January 2002.	▪ Determine location, extent, and spatial area of wetlands at select areas along the Kalamazoo River and Portage Creek. ▪ Confirm the existing National Wetland Inventory (NWI) maps. ▪ Make risk management and remedial decisions for Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site.	▪ Review of existing data and maps ▪ Field surveys to confirm the approximate wetland boundary area within the project study area ▪ Survey of wetlands adjacent to the 12th Street Landfill	▪ Field conditions encountered are consistent with the NWI map.	▪ Text notes that freestanding water is present to the base of the landfill. Questionnaires in Appendix note that soil is saturated to the surface, but no depth of ponded water is recorded.
(U.S. EPA, 2004). "Final Data Summary Report, Soil/Sediment Sampling Results, Pre-Design Sampling, 12th Street Landfill, Operable Unit #4," United States Environmental Protection Agency, Region 5. July 2004.	▪ Conduct predesign sampling to further delineate PCB contamination in the former powerhouse discharge channel and the floodplain/wetlands and woodlands area. ▪ Build upon previous investigations, and further define the extent of contamination. ▪ For powerhouse discharge sampling, evaluate the potential for PCB contamination from bank erosion, assess the potential for contamination migration from upstream sources and from flow around the east bank of the discharge channel, and assess the extent of contamination across the width of the channel. ▪ Provide preliminary estimates of the volume of PCB-contaminated material outside the landfill.	▪ One hundred fifty-nine soil/residual samples collected from 50 locations outside landfill footprint — Samples collected from 0-6, 6-12, and 12-24 inches ▪ Thirty-four sediment samples (powerhouse discharge channel) from 16 locations — Samples from 0-6 and 6-12 inches ▪ All samples analyzed for PCBs, only	▪ Approximate volumes of PCB-contaminated soil and sediment were found at — 12,300 CY with PCB conc. > 0.6 mg/kg, — 3,300 CY with PCB conc. > 4 mg/kg, — 1,500 CY with PCB conc. > 8 mg/kg, and — 150 CY with PCB conc. > 23 mg/kg. ▪ Property to southwest (quarry) was not investigated due to access issues. ▪ Woodland area to southeast may require closer sample spacing to delineate contamination. ▪ Concentrations of PCBs found in the former discharge channel ranged from 0.016 mg/kg to 7.7 mg/kg, with a reported average concentration of 0.44 mg/kg. ▪ Residuals from the landfill appear to have entered the channel through erosion of the landfill, but potential surface water flow around the northern end of the eastern bank of the discharge channel may also be a source of low-level PCBs. ▪ The area requiring consolidation is the soil/residuals within the wetlands along the northern and western boundaries of the landfill extending less than 100 feet from the landfill.	▪ Soil borings were advanced only to a 2-foot depth, even if residuals were encountered at the base of the boring. ▪ Borings through sediment in the former powerhouse discharge channel do not visually identify residuals (as opposed to river sediment).
(RMT, 2007c). "Emergency Response Plan Design Report, Allied Paper, Inc./ Portage Creek/Kalamazoo River Superfund Site." RMT, Inc. July 2007.	▪ Perform a geotechnical investigation to determine the extent, height, width, and the materials used in a reported containment berm, buried beneath residuals and fill material, along the Kalamazoo River, and other areas of the landfill. ▪ Visually classify the materials used in the construction of the berm to approximate the physical characteristics of the material for use in a slope stability analysis to support the Emergency Action performed by Weyerhaeuser in 2007.	▪ Twenty-six Geoprobe® borings along six transects on the eastern slope of the landfill adjacent to the Kalamazoo River channel, the MDNR property, and in the wetland to the north, were sampled continuously and logged by an on-site scientist.	▪ No buried containment berm was found during the investigation. If a berm had been placed, the berm was a mixture of materials similar to, and not easily distinguishable from, the paper residuals which it was to retain. ▪ No discernible material of different grain size, moisture content, consistency, or strength was identified beyond the typical range of materials found in the landfill.	▪ Transects of Geoprobe® borings were used to develop cross sections of the eastern area of the landfill adjacent to the Kalamazoo River channel, the MDNR property, and the wetland to the north. ▪ Because no berm was located, the results of the landfill material testing completed by BBL (2001) on the entire landfill were used for input into slope stability calculations for the Emergency Action performed by Weyerhaeuser in 2007 I(RMT, 2007c).

Appendix E
Select Figures From Previous Investigations



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Environmental Services

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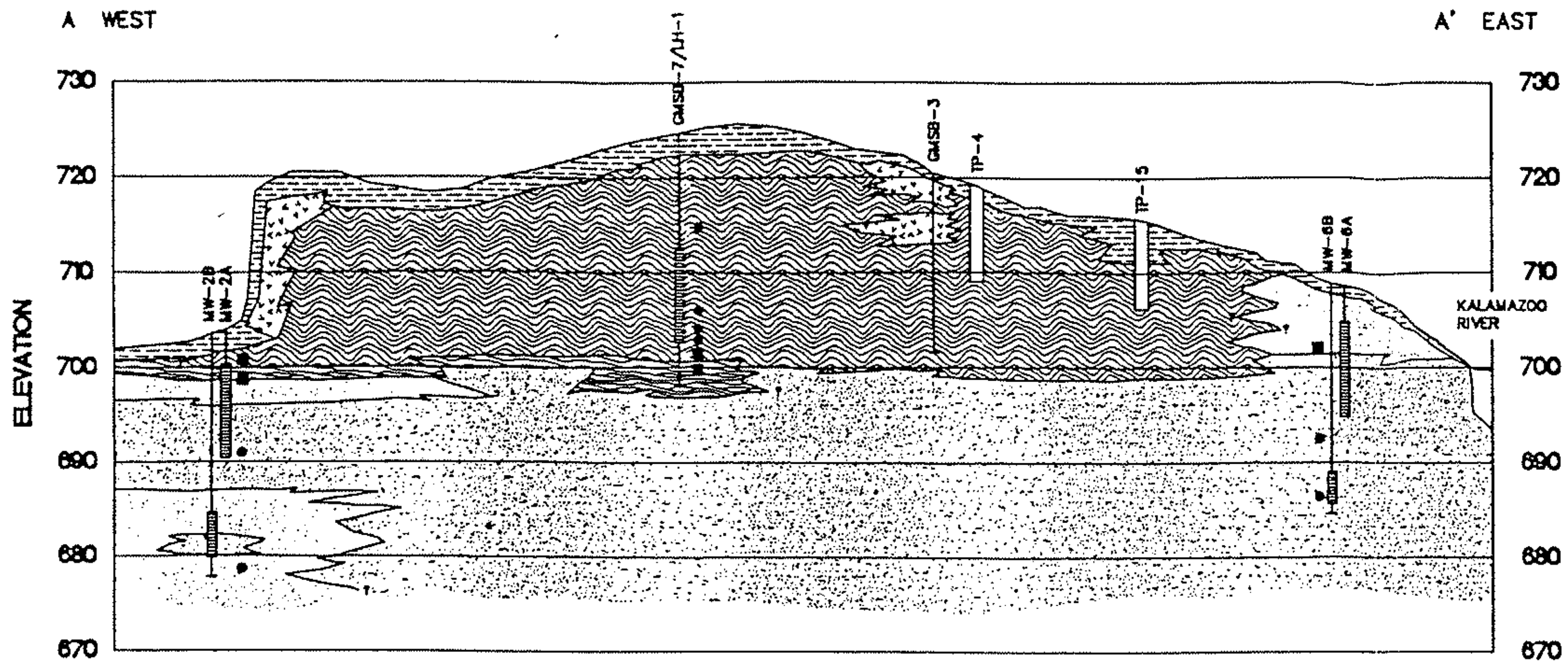
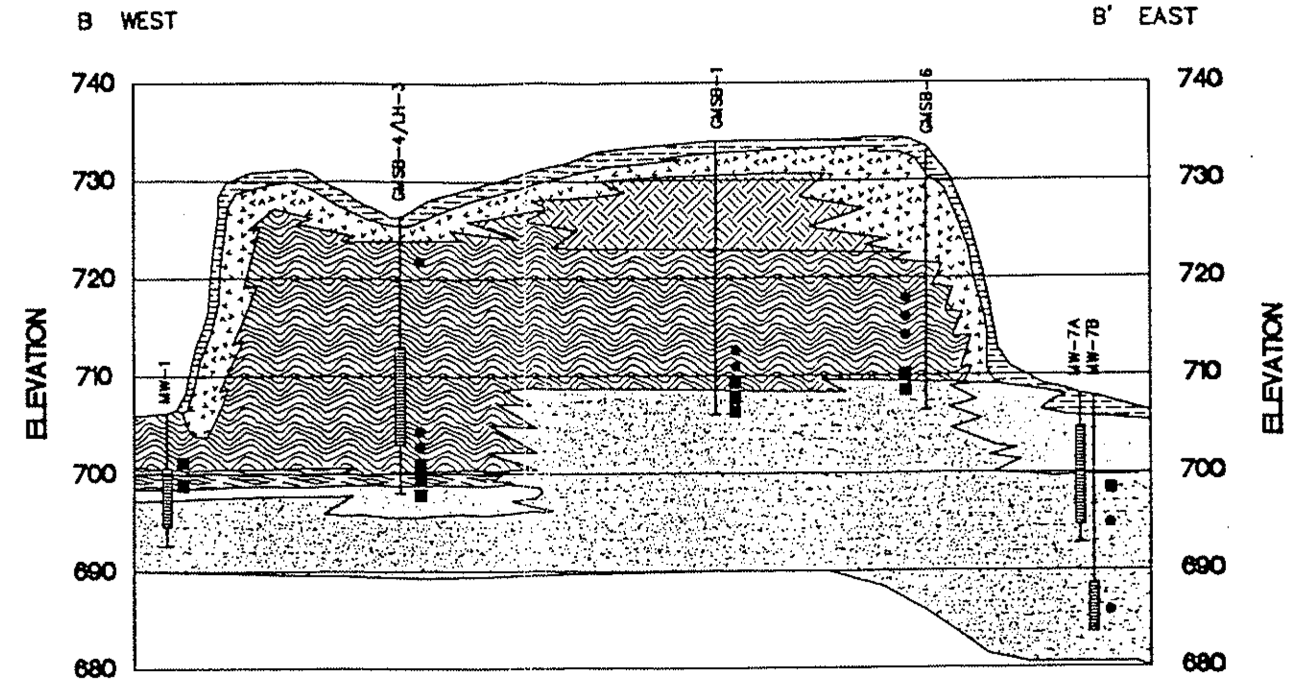
LAST REVISION BY: [illegible] | DATE: FEB. [illegible] 1994

CROSS-SECTION LOCATION MAP
REMEDIAL INVESTIGATION TECHNICAL MEMORANDUM 8
12th STREET LANDFILL OPERABLE UNIT
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE

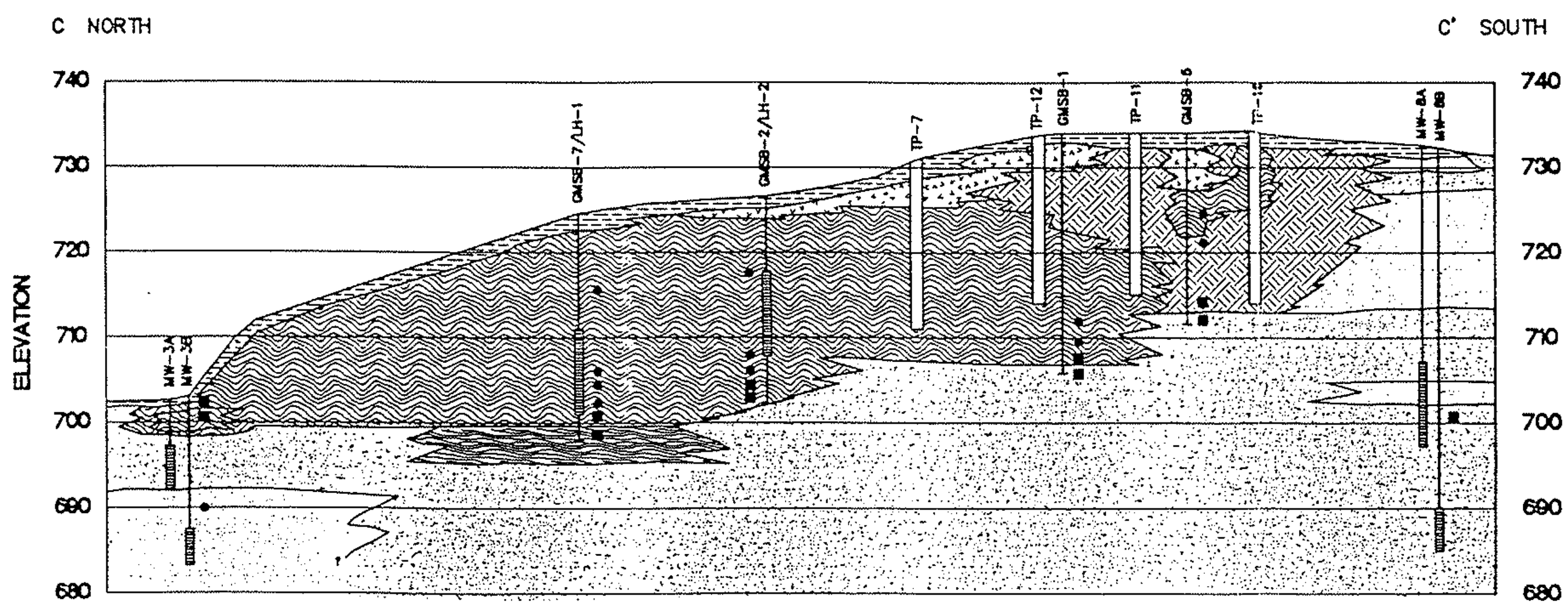
FIGURE
1/2



GEOLOGIC CROSS-SECTION A - A'



GEOLOGIC CROSS-SECTION B - B'



GEOLOGIC CROSS-SECTION C - C'

LEGEND

- TOP SOIL: BROWN TO TAN SANDY ORGANIC-RICH TOPSOIL
- FLY ASH
- CONSTRUCTION DEBRIS: MEDIUM SAND, CONCRETE, WOOD, BALE WIRE, CORRUGATED METAL AND MISCELLANEOUS WASTE
- RESIDUALS: GRAY TO BLACK SANDY TO CLAYEY PAPER RESIDUALS
- FINE TO MEDIUM SAND: TAN TO WHITE TO BROWN FINE TO MEDIUM SAND, TRACE COARSE SAND: "SAND UNIT"
- MEDIUM TO COARSE SAND: MULTI-COLORED MEDIUM TO COARSE ROUNDED TO SUB-ROUNDED SAND WITH GRAVEL: "SAND AND GRAVEL UNIT"
- PEAT: DARK BROWN TO BLACK PEAT
- GEOLOGIC CONTOUR (QUESTION MARKS WHERE INFERRED)
- LOCATION OF SOIL SAMPLE SUBMITTED FROM BORING FOR ANALYSIS OF CONSTITUENTS ON TCL AND TAL
- LOCATION OF SOIL SAMPLE SUBMITTED FROM BORING FOR ANALYSIS OF PCBs
- MONITORING WELL WITH SCREENED INTERVAL
- BASE OF BORING
- MW-3A MONITORING WELL DESIGNATION
- GMSB-7/LH-1 SOIL BORING/LEACHATE HEAD WELL DESIGNATION
- TP-7 TEST PIT OR TRENCH DESIGNATION
- GMSB-3 SOIL BORING DESIGNATION

NOTES:
1. TOPOGRAPHIC PROFILE BASED ON BLASLAND & BOUCK WORK PLAN BASE MAP, DRAWING 6459037R/64590G01.DWG.
2. THE DEPTH AND THICKNESS OF SUBSURFACE UNITS ON THE CROSS-SECTIONS WERE GENERALIZED FROM AND INTERPOLATED BETWEEN BORINGS AND TRENCHES. INFORMATION ON THE ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT THE INDICATED LOCATIONS.

KB60105732

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Environmental Services

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GEOLOGIC CROSS-SECTIONS OF LANDFILL

REMEDIAL INVESTIGATION TECHNICAL MEMORANDUM 8
12th STREET LANDFILL OPERABLE UNIT
ALLIED PAPER, INC./PORTAGE CREEK/
KALAMAZOO RIVER SUPERFUND SITE

FIGURE 2/2